THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

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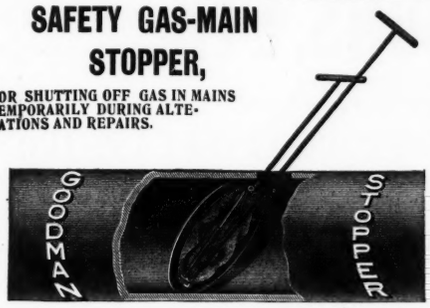

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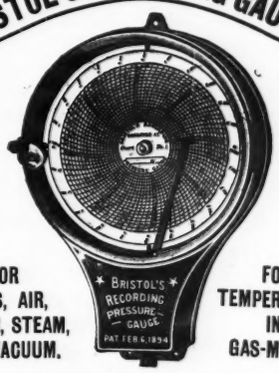

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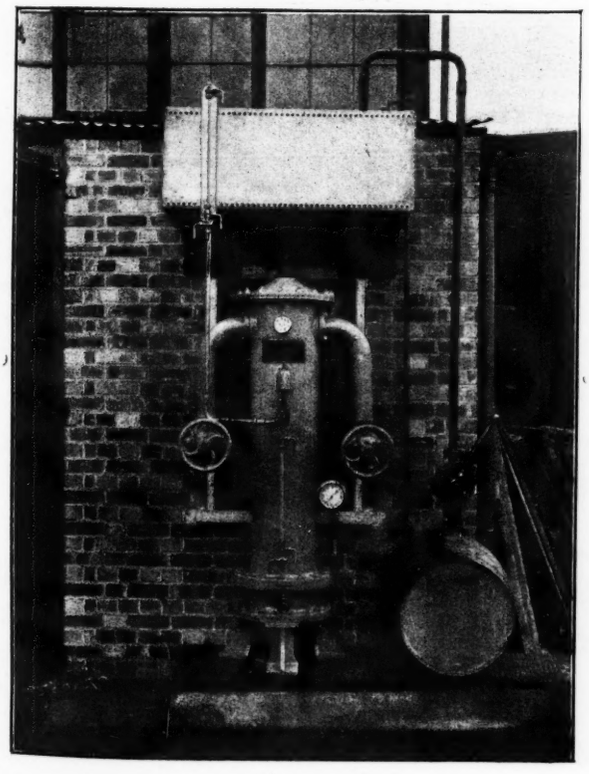

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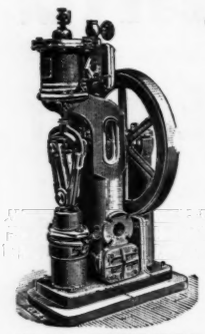

Fig. 705. "SINGLE RAM" STEAM-PUMP.

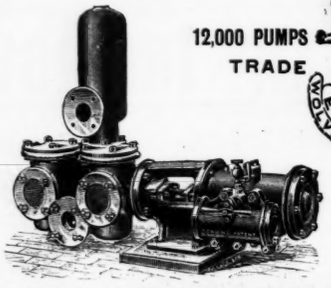

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

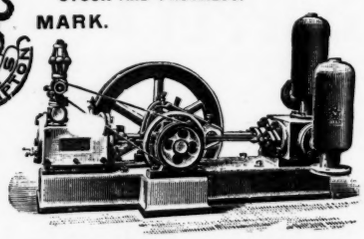

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

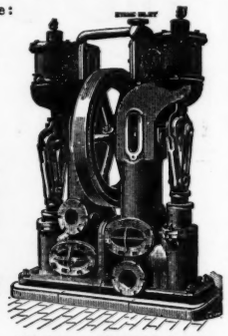

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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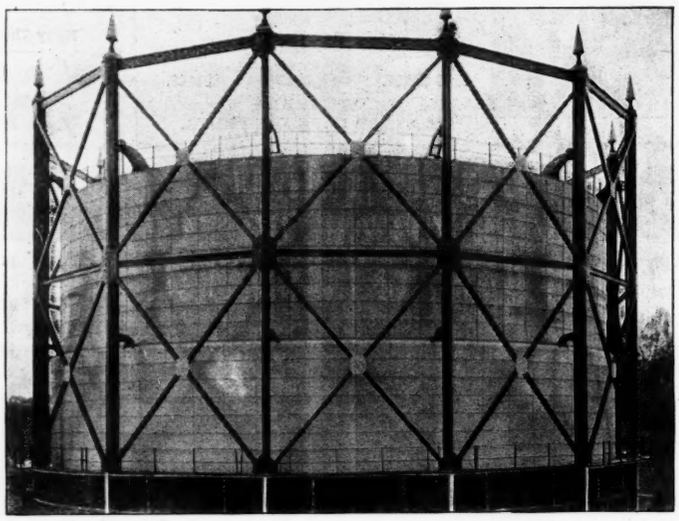

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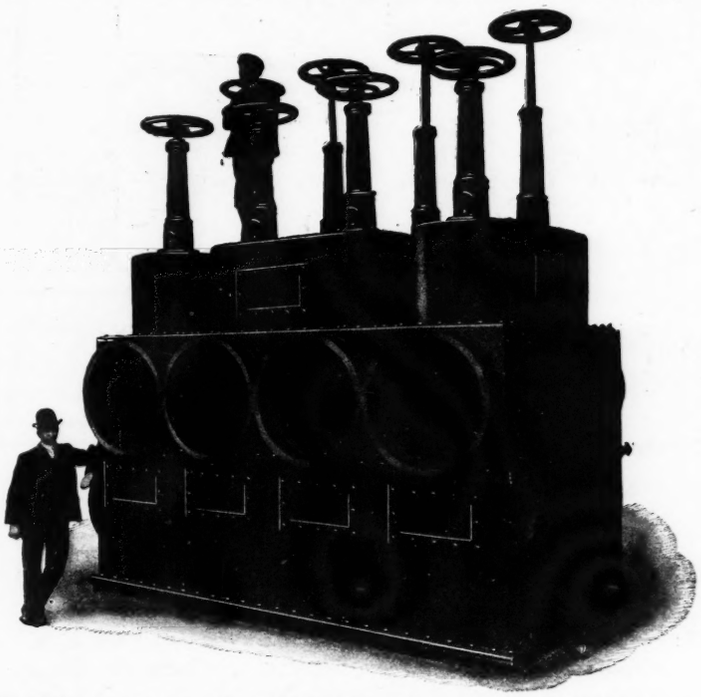

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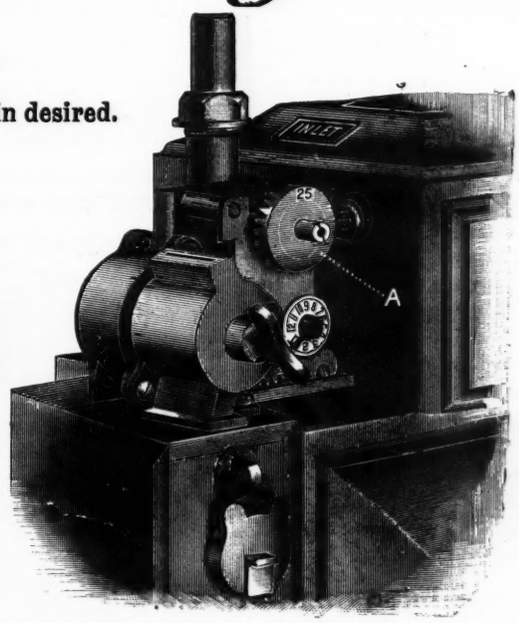

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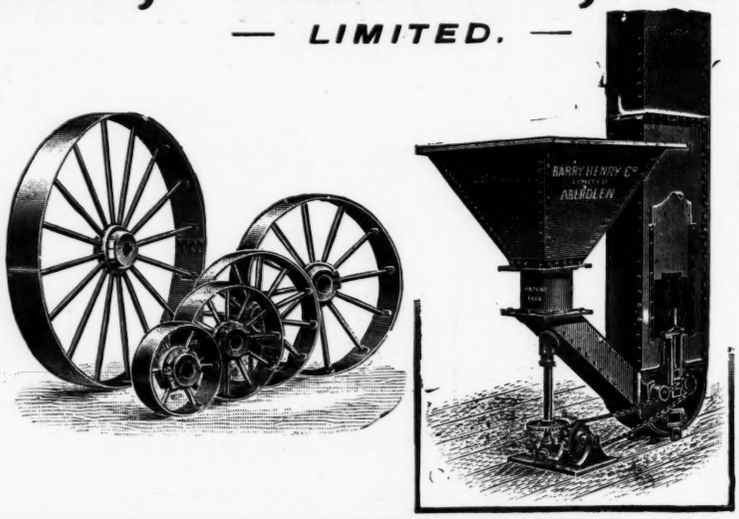

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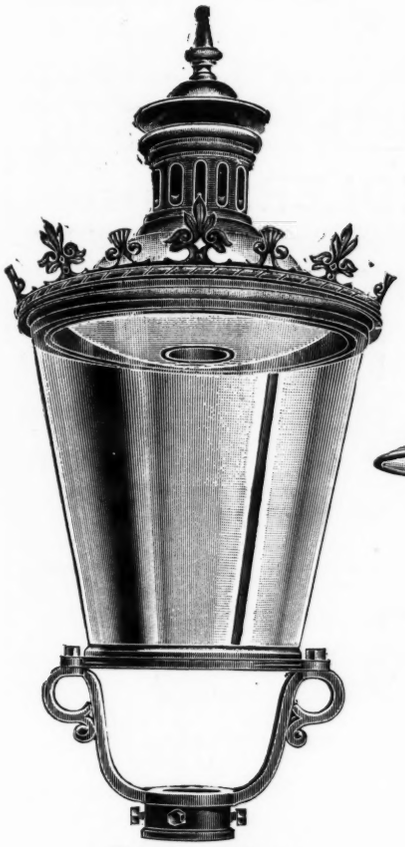

Fig. 35. 100 c.p.

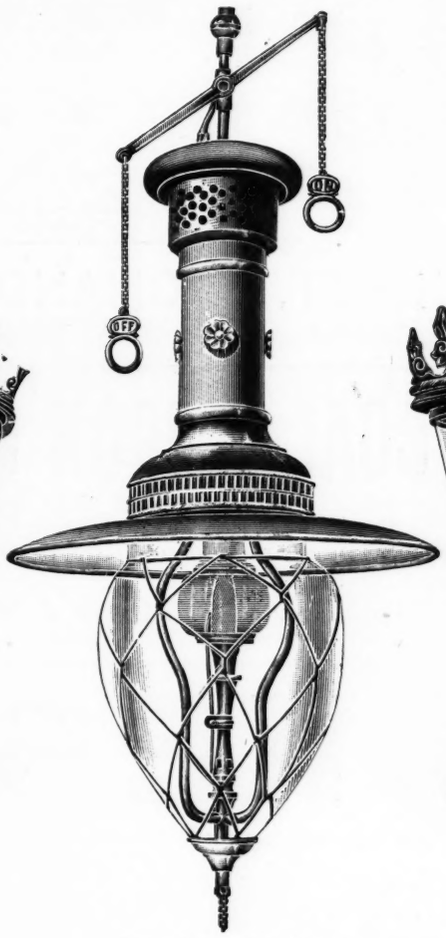

Fig. 607. 600 c.p.
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Fig. 35a. 300 c.p.
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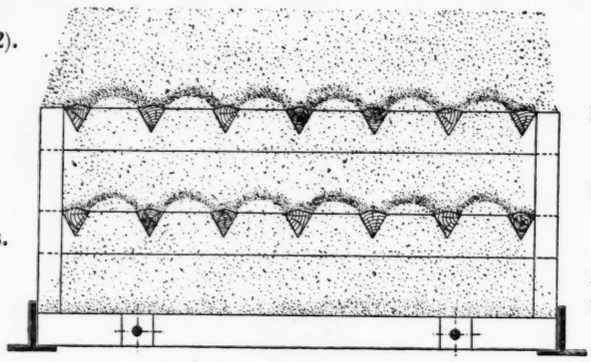

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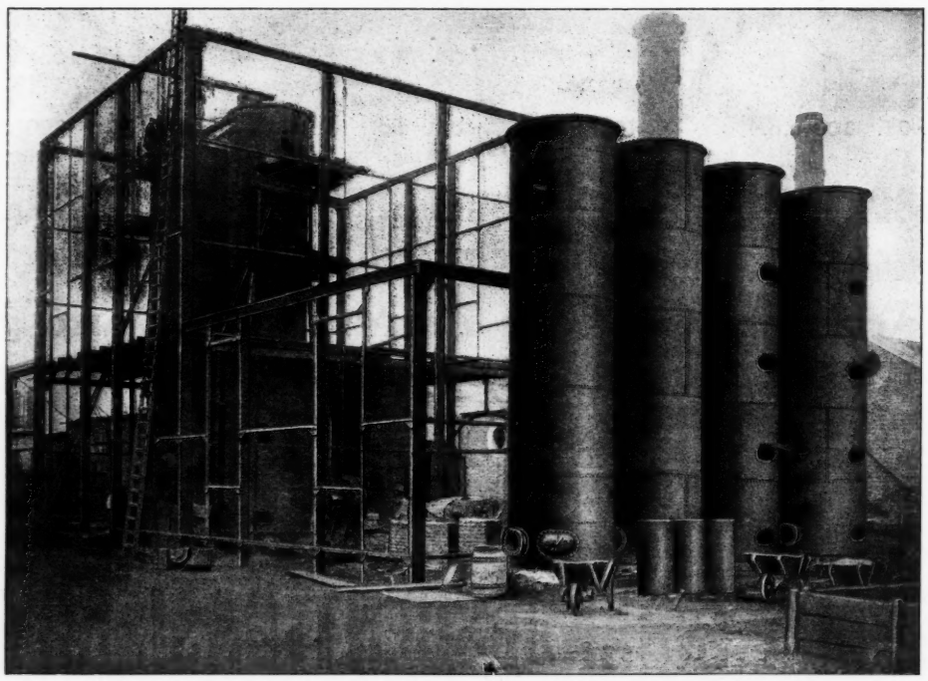

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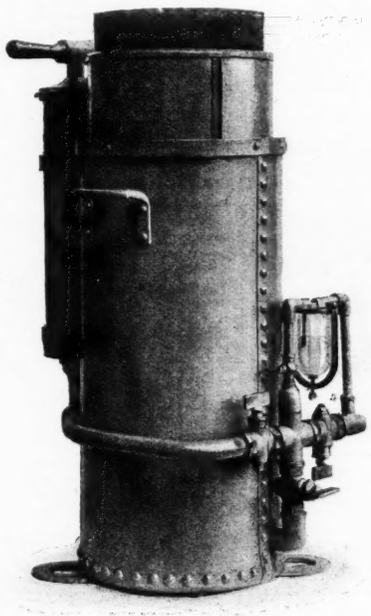

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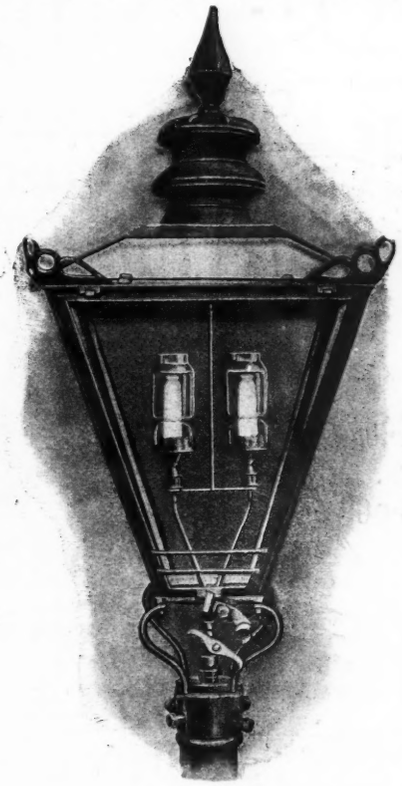

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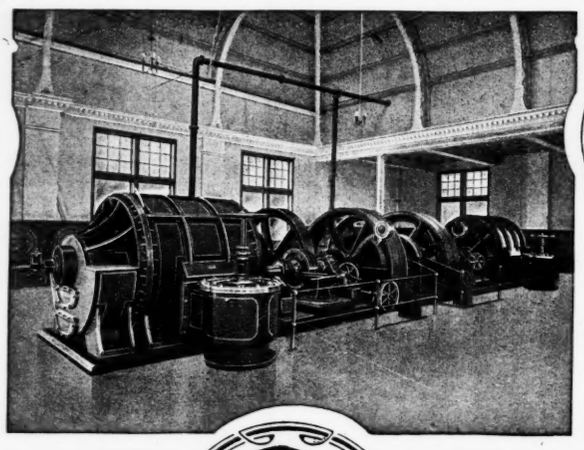

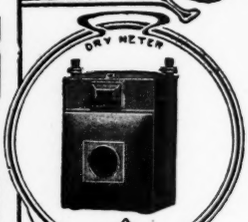

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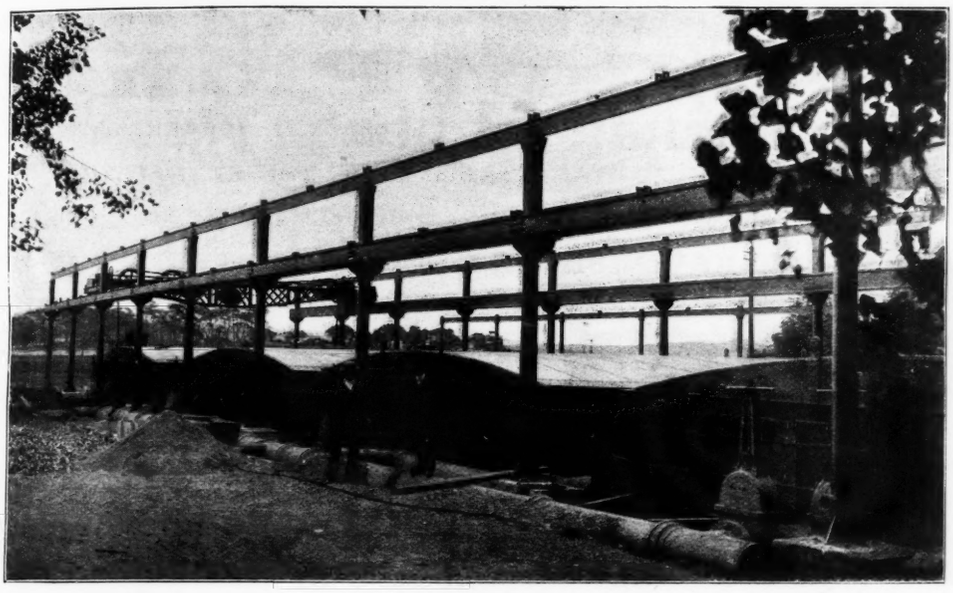

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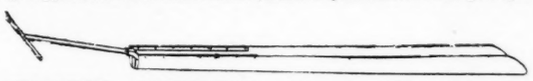

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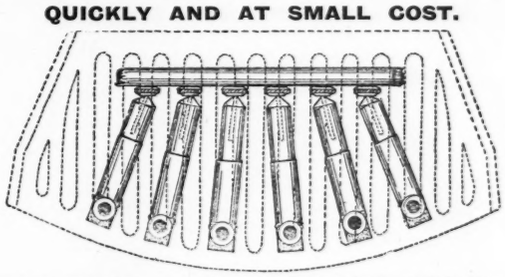

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CONTENTS.

EDITORIAL NOTES.

GAS, &C.—
An Untrammelled Gas Undertaking . . 157
Wanted, a Competent Investigation into the Novelty of Invention 157
Public Lighting by Electricity in Croydon. 158
Associated Commercialism 159
Ill-Advised Gas Legislation in New York—The Lesson of the Longridge Explosion—The Duty of the Ratepayer—Corporation Thrift Schemes—An Electricity Undertaking's "Profit" 160

Gas Acts for 1905 162
Electric Lighting Memoranda 163
Chemistry of Manufacturing Processes . . 165
Gas Stock and Share Market 165
Lowering a Forty-Eight Inch Gas-Main . . 166
The "First Garden City" Gas-Works. . . 167
The Works of the York United Gas Company 170
Purifying Gas with Ammoniacal Liquor . . 172
The Analysis of Raw and Spent Lime. By H. Leicester Greville, F.I.C., F.C.S. . . . 173
Purifying Gas from Sulphuretted Hydrogen, By Thos. Holgate, M.Inst.C.E., F.C.S. . 174
Inverted Gas-Burners. By Professor H. Drehschmidt. 175
Gas-Engines for Electric Transmission . . 176
A Visit to Vauxhall Gas-Works. 177
Scottish Junior Gas Association—Western District 177
Gas-Lighted Signs. 179

REGISTER OF PATENTS.

Gas-Mantles—Sutton, C. J., and Rudd, J. . 179
Washers and Scrubbers—Kirkham, Hulett, and Chandler, Limited, and Hersey, S. . 179
Regenerator Tubes for Retort-Settings—Townsend, H. 180
Regenerative Furnaces for Gas-Retorts—Spencer, F. 180
Rotary Meters—Thorp, T. 180
Washing Gases—Capell, G. M.. 181
Indestructible Filament for Gas and Electric Lamps for Lighting and Heating Purposes—Michaud, G., and Delasson, E. . . . 181

REGISTER OF PATENTS (*continued*)—

Manufacture of Illuminating Gas—Busse, P. 181
Removing, Restoring, and Adjusting the Seal on the Dip-Pipes of Gas Retorts—Townsend, H. 181
Lighting-up Street and Other Gas-Lamps with Burners Beyond the Reach of Hand—Pare, W. 182
Padlocks for Gas-Meters—Glover, R. T. . . 182
Scurfing Bar for Gas-Retorts—Parker, J. . . 182
Gas-Stove Burners—Fletcher, Russell, and Co., Limited, and Neil, J. & W. R. . . . 183
Extraction and Purification of Sulphur—Cornillaux, A. V. 183
Gasholder Tanks—Creeke, R. W. B., and Barker, J.. 183
Testing Burners—Carpenter, C. 183
Patent Notices 183

MISCELLANEOUS NEWS.

Croydon County Council and Electricity . . 184
Gas Affairs in New York City 184
London County Council and Gas Supply . . 185
Gas-Meter Testing in London—The Testing of Indices. 186
Explosion in a Sulphate-House. 186
The Explosion at the Longridge Gas-Works. 188
Stourbridge Gas Department—Mr. W. North's Resignation 188
Devonport Corporation Gas Undertaking—Shortage in the Stock of Coal 188
Price of Gas to Manufacturers in Birmingham 188
Extensions at the Carlisle Gas-Works—Local Government Board Inquiry 189
Street Repairs and Broken Gas-Pipes. . . 189
Sale of Gas Appliances at Nottingham—The Ironmongers and the Gas Committee . . 189
Metropolitan Water Board—Annual Inspection of Works; Statistics of Supply. . . 190
The Water Supply of Liverpool 190
Cheaper Gas for Lighting Rochdale . . . 190
The "Primary Needs" of Louth 190
Notes from Scotland 191
Current Sales of Gas Products 193
Coal Trade Reports 194
Stock and Share List 200

PARAGRAPHS.

Midland Association of Gas Managers—The Lighting of Art Galleries—Manchester and District Junior Gas Association 161
A Popular German Pamphlet on the Value of Gas 163
Modern Street Lighting 166
Personal and Obituary 172
New Issues of Directories—Gas Companies' Protection Association 172
Good News for Mantle Makers 183
Brixham Public Lighting 186
Summons Granted Against a Gas Manager . 187
Electric Light Failure at Battersea—Praise for Rochdale Gas-Works Management . . 193
Crewe Water Supply—Public Lighting of Burnham—The Sutton Gas Company and their Sulphate Effluent—Bolton Gas and Water Supply—Display of Incandescent Gas Lighting at Bristol—Halifax Gas Affairs—Supplying a Lamp as an Advertisement. 195
German Incandescent Gas-Burner Trade—Taunton Water Supply—The Colour of the Birmingham Welsh Water—A Gas-Main Ablaze—Tees Valley Water Board—Lead Poisoning Cases at Mossley—Leicester and the Derwent Water Scheme 196
Diminishing Water Reserve at Stockport—Kingsbridge Water Supply—A Successful Half Year at Swansea—Stockport Plumbers and the Gas Committee—Poll on the Shrewsbury Water Question—Quality of the Gas at Rhyl—Penzance Water Supply . . 197
Gas for Heating and Cooking Purposes in St. Petersburg—A Complaint and an Explanation—Woking District Gas Company—Oil-Lamps for Donaghadee—Penny-in-the-Slot Gas-Meters Decrease Petroleum Lamp Accidents—Additional Capital for the German Incandescent Gas-Light Company—Public *v.* Private Ownership of Gas-Works. 198
Morley Gas Supply—Leeds Gas Workers and the Unemployed—More Fires through the Fusing of Electric Light Wires—Coventry's New Gas-Works. 199

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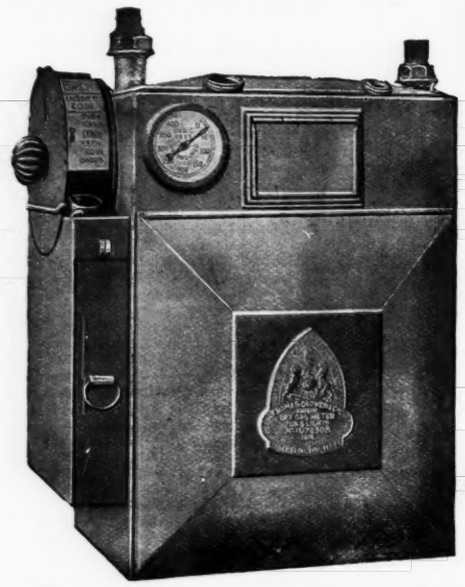

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EDITORIAL NOTES—GAS, &c.

An Untrammelled Gas Undertaking.

IN this week's issue is given an account of the gas-works which have been erected for the First Garden City, to the designs and under the advice of Mr. Charles Hunt. When it is mentioned that the present capacity of the works is but 6 millions per annum, with provision in their arrangement for duplication, and in parts more, it may be thought that the design and starting of such a works and business would be mere diversion for a professional man accustomed to thinking of, and planning in, millions per day. But, as a matter of fact, it is almost as difficult a matter to drop so far down the scale of production to arrive at proper proportions as it is for engineers conversant with only moderate-sized plant to design the engineering structures for a works to produce as many millions in a day as they have been in the habit of dealing with in a year. However, Mr. Hunt at the First Garden City has demonstrated the elasticity of his engineering skill, and has shown there what modern works on a limited scale, but with a hopeful future, should be at the beginning, and not only the works themselves, but the administrative policy, which in these days—and especially in the case of a gas business that has yet to establish itself—should be as broad as possible. In the works themselves, there is nothing beyond what is required for the manufacture of a plain coal gas of good calorific power and low illuminating quality; and out in the district, business is being invited on the liberal lines of free meters, gas cookers, and fires, at a commencing price for gas of only 3s. 3d. net per 1000 cubic feet. The Directors will, of course, be glad to see profits from their gas enterprise; but they are not hungering for them—wisely believing that in the long-run there will be larger returns, and the interests of the consumers will be far better served, by taking every means, even to a moderate price, for building up a sound business. In what they are doing, they are getting as near as they can to the fundamental principles of co-operative commercialism as now generally understood, without the consumers being actually partners in the business. Herein they are acting prudently in the interests of a certain and lasting prosperity.

This Garden City gas undertaking appeals to us as being unique in two important particulars. It must be without record that a gas undertaking has ever before started business on such a low price as 3s. 3d. net per 1000 cubic feet, and lower prices by arrangement for manufacturing purposes. In the second place, we know of no gas undertaking engaged in general supply that is unfettered legislatively or locally as is this one. The bare idea of such freedom in store for them would be almost sufficient to turn the heads of some of our much-harassed gas engineers and managers. The business, in fact, opens under no restriction whatsoever. The "First Garden City, Limited," are owners of about 6 square miles of estate, upon which they are successfully developing their housing scheme for the poor, the middle class, and the rich alike, which scheme is designed to present the country with an object-lesson of what a town should be. It is a private estate, and with private roads, within which the Company can do as they please. The gas undertaking consequently acknowledges allegiance to no one but the Directors of Garden City. There is, therefore, nothing whatever to prevent them, under the advice of their Consulting Gas Engineer, supplying the district with the quality of gas that they think most suitable to its varied uses, and to make what terms they choose with their consumers according to the character of their custom. But the Directors are not going to abuse their liberty. They have fully considered the position with their adviser. The town is a new one, and the houses are likewise new; so that for illumination nothing but incandescent burners are likely to find place within them. The other uses of gas will be for heating and cooking and for motive power; and, therefore, what more can be required than a gas of about 12-candle power? That is the illuminating power to which the Company are proposing to work from the outset. We wish that a gas-works with this absolute liberty in all things was situated somewhat nearer London, or some other great centre; for there would be found precisely what the gas industry have wanted for a considerable time—a concern under such working and supply conditions that unrestrained investigation could proceed in them. Of this we are convinced, that the Board of the First Garden City is composed of men who will not, if they can be of service to the gas industry through their unique position (without detriment to the interests of those they serve), refuse to do their part in furthering our knowledge by experience of what is possible in connection with gas supply. The South Suburban Gas Company are held back by law and local obscurantism from doing all they are willing to do in obtaining that experience which would tend to progress in satisfying the requirements of the day. The First Garden City gas undertaking, however, is "a law unto itself;" and from it Mr. Hunt or the Resident Engineer (Mr. A. W. E. Bullmore) should, in time, have something of a useful nature to impart regarding, at any rate, the knowledge they will derive from the distribution of, and trading in, a low illuminating power gas of good calorific value. The gas undertaking of the First Garden City, modest as it is, will certainly hold unusual interest for the gas profession; and we welcome its inauguration with the most cordial wishes for prosperity.

Wanted, A Competent Investigation into the Novelty of Invention.

DISSATISFACTION with our Patent Laws and the system—if "system" it can be called—governing the issue of letters patent is ever with those among us who have to deal in any way with inventions. As the months pass by since the Board of Trade put into force the new Patents Act of 1902, it becomes more and more apparent that the constituting of the Patent Office authorities judges of novelty or otherwise of an invention is not going to relieve that dissatisfaction, or give any more certainty to the inventor than before in the, to him, important question of protection. In writing upon the subject in the "JOURNAL" on Jan. 17 last, it was remarked that "it would seem the Patent Office has been "invested with duties which are beyond its strength "to perform efficiently. There is considerable risk of "either injustice being done to applicants, or of the Act "itself becoming a dead-letter." The "dead-letter" appears to be the ultimate state towards which things are fast drifting; and it ought at once to be a matter for the consideration of the authorities whether something of a more rational character cannot be made to grow out of the system of investigation that the Act instituted.

The questions bearing upon the consideration of the general subject are manifold and complicated. A correspondent—Mr. J. Bridger—has drawn attention to some of them. Mr. Bridger is intimately associated with the gas-lighting industry; and in that connection has had considerable experience of the scant protection and bitter trials that the defects of the Patent Laws of this country inflict upon inventors and the owners of patents. His complaints are many, but, though many, they are the fruits of experience, as is also his principal suggestion. The latter prompts us to deal with the subject here rather than in another part of the "JOURNAL." It is not a fresh matter of regret on the part of inventors that, after considerable outlay for Patent Office fees, a patent is granted, without the slightest guarantee of validity. What is wanted to impart that guarantee is more discretion and a broader reference to those who can give an authoritative pronouncement on the question of the novelty

of an application. Instances are to be found even in the gas-lighting field, of the principal features of a prior patent being taken for the purpose of protecting an auxiliary improvement of doubtful utility. Of course, of subservient "improvements" there are good, bad, and indifferent. But there are more of the last two than of the first-named; and, in many cases, these so-called "improvements" are only, to speak plainly, tricks to get a "patented" article. This kind of thing has involved genuine inventors in an almost overwhelming amount of trouble and legal complication, against which they ought to be protected, as this form of piracy has been the means of robbing of the rewards of their ingenuity many inventors who have not the means of defending themselves. Subsidiary inventions of a really valuable character there are; and in such cases use of the improvement can be made the subject of agreement with the owners of the major patent, or, in the event of difficulty in arriving at an agreement, the Board of Trade may be petitioned to grant a compulsory licence. Assuredly, however, something could be done to limit the claims in connection with these subsidiary, and in some instances foolish, devices, as many an inventor has been led to believe that by having a patent granted—it may be for a thing of questionable utility—the privilege is his of making use of another person's invention in the exploitation of his own supplementary one.

From the cases brought to notice even in appliances and fittings for gas lighting alone, the exercise of the functions of the Patent Office authorities in judging as to novelty or otherwise is farcical and, as such, a failure. The persons engaged in the work are either not competent to judicially discharge their duties, or else the work is perfunctorily done, for some shocking examples of patents having been granted within the past few months for ideas that have been in use for years, and do not show the slightest inventive ingenuity, have come before us. If the investigation provided for by the Act of 1902 is to have any real value from the protective standpoint, these things ought not to be, and the Patent Office ought not to be enriched to the extent of the full fees in obtaining letters patent in such cases. What are urgently needed are proper channels of inquiry, with technically qualified persons engaged in the work, which would ensure both justice and the rejection (of course, with the right, if thought worth while, of an appeal) in cases where it was decided there was want of novelty. The Patent Office search certainly does not afford the necessary information in regard to the possibility of an invention being forestalled by a "prior user" before granting a patent; and this is what technically competent authority would readily distinguish if the Legislature would recognize that there exists a substantial grievance and a mischievous system which require remedying. Such means of reference cannot surely be outside the pale of "practical politics;" and if, from our scientific and technical organizations, a commission of inquiry were appointed, we venture the opinion that they would not rise from their labours without pointing the way by which efficient investigation could be made—by which investigation could be distinguished not only novelty, but discrimination made between prior inventions without commercial value and those like in principle but possessing commercial value. Most branches of industry have their technical societies; and it should not be impossible for the representative among those societies to nominate suitable persons whose time, in whole or in part, should be given up to this work of investigation—of course, with adequate remuneration attached to the office. These nominees would supply the components of a thoroughly qualified department of the Patent Office; and there is little doubt, although humanity cannot claim infallibility, that less injustice would then be done inventors than at the present time, less money would be squandered, and the occasion for litigation would be less frequent through the granting of letters patent to worthless productions. The Patent Office as its work is done to-day appears to be little better than a State money-making department; and that should not be its chief function.

In perhaps not so many words, this is the suggestion that Mr. Bridger makes for the defence against freebooters of genuine inventors in whatever branch of industry their invention falls, and for the protection of the poor inventor, the uninformed, and even the impracticable genius and crank. The real inventor clearly requires protection against not only those who endeavour to plunder him, but against some of the latter, for from their frailties issue no end of anxiety and frequently monetary waste. The conclusion therefore is that the new law has so far by its results proved its own insufficiency; and something better is required. It is not a reputable thing that the complaint against the Patent Office should be so widespread, and that the charge that its system conduces to malfeasance and promotes misconception should be, by the records of both past and present, proved so well-founded. Of course, however good the system may in future become, it will not assist the holders of valuable invention to altogether evade the Law Courts; but it will go a long way towards doing so. The points bearing upon this question submitted by Mr. Bridger are not unworthy of consideration, though we have not enlarged so freely upon them as their importance invited.

Public Lighting by Electricity at Croydon.

The Croydon Borough Council are a long while getting a fair grip of the public lighting question; and the one step forward since the last reference was made to the matter is a speech by Alderman Miller, the Chairman of the Lighting and Electricity Committee, which, if it is supposed to constitute a reply to the Gas Companies' recent statement, is as such about as vacuous as it can well be. Alderman Miller charged the Gas Companies with having gone on a "side-issue" in making their comparisons on the practical line of cost per mile. Perhaps the suggestion will hardly be entertained by the Alderman that there can be very few people outside the Council whose intelligence will not allow them to see that his own speech was composed of a perfect concatenation of side-issues. The practical aspect of the question is pushed by him on one side in favour of taking a stand on this question that has not an atom of commercialism in it. It is suggested that the Croydon Corporation should judge this matter at cost per nominal candle power—the dissipated as well as the effective—per annum. It is pertinent to inquire whether Alderman Miller buys cloth at per yard or per thread. Quality, of course, comes in; and we maintain that the effective illuminating power, cost for cost, is far greater with the incandescent gas-light than with the electric light. If our report is correct, the Alderman deliberately made a misleading statement to the Council on this point of cost, when he said that the Gas Companies, in giving their prices per mile, took certain roads where the gas-lamps were 200 yards apart. Their report distinctly states that the average distance apart is 105 yards; while the Electric Lighting Committee's own report put the average distance at 80 yards. The Alderman waxed eloquent upon some peculiar advantageous freak he seems to imagine the electric light possesses for throwing light "backwards and forwards." He is a bit opaque on the matter; but whatever benefit accrues from this restlessness of the electric light, the same benefit, judging from roads lighted by incandescent gas-lamps, can be obtained from the steady gas at much less price per mile. What, asks the Alderman, would be the condition of the main streets if the Corporation went back to gas? The form of the question suggests that it was put in a lugubrious tone. The reply is, "Take train for the City and see," for the sight will give pleasure and confidence. If it is plenty of light that is required, and the Corporation will deal as generously in the matter of payment with the Gas Companies as they do with the Electric Lighting Committee per mile of streets, the former will no doubt be greatly pleased to excel the quantity of light now given on the surface of the roadways and footpaths of the main streets of the borough.

But what Alderman Miller's speech is most remarkable for is its omissions. He shuns everything in the Gas Companies' statement that most directly concerns the ratepayers, and appeals to imagination by drawing a picture of fearfully-crowded streets in which, from his interested point of view, electricity only can prevent disaster. He does not state why it is that the cost of lighting by incandescent gas-lamps 127 miles of streets in the borough in 1904 only cost £7062; while the cost of lighting only 18 miles (3½ miles very indifferently with Nernst lamps) of thoroughfares by electric lamps worked out to over £400 more than the above, or in the total to £7500. This charge is out of all proportion to the payment for gas, and to the increased benefits obtained, which "increased benefits" are realizable, as the Gas Companies wish to demonstrate, at a more reasonable cost. If the whole of the illumination in the 127 miles of gas-lighted streets was concentrated in the 18 miles, there would be a remarkable increase in the volume of light

compared with that given by the arc lamps, and, as the 1904 figures show, at less cost. But the "whole" illumination from the 127 miles is not required in the 18 miles of streets, and therefore it would be, as it is now, wasteful to spend in them anything like the £7000 or the £7500.

With a levity unbecoming an Alderman, the Chairman of the Electric Lighting Committee spoke of "fairy tales" having been told concerning other towns. One of them referred to Liverpool. With the City Lighting Engineer of Liverpool, we have no knowledge as to the source of the statement that in that city incandescent gas lighting has replaced the electric light, though we ourselves may have said that it is pretty clear that in Liverpool the incandescent gas-light has now stopped the progress of the electric arc. It is not at all wearying to point out again that the City Lighting Engineer of Liverpool, in his last report, states that 4½ miles of streets are lighted by electricity (as against the 18 miles in Croydon), 426½ miles by incandescent gas, and the remaining 10½ miles (back streets) by ordinary flat-flame burners, which are gradually disappearing. Therefore Croydon is more extravagant than the city of Liverpool. When the letter from Liverpool was read in the Council Chamber, there were loud cheers from Alderman Miller's supporters. We listen for a repetition of the cheers when they learn the truth about Liverpool. Bradford requires no reference, seeing that only 51 arc lamps find use there. We do not know who has stated that Islington (which has its own electric lighting undertaking) has discarded the electric light. This, however, we do know, that, in Islington, the District Auditor in July last made the significant statement that "where electric arcs take the "place of incandescent lamps, the annual cost to the rates "is increased in the proportion of about ten to one;" and that Alderman Tomkins, at the meeting last August of the Borough Council, called attention to the £9900 charged in the estimates for the "small number" of arc lamps against the £6900 for the "large number" of gas-lamps. Does not this tell the same old tale of the ratepayers being penalized for the maintenance of the Electricity Department? That and nothing else is the aim of Alderman Miller and his colleagues. Greatly elated, Alderman Miller quoted the continuation of a contract that the Westminster City Council, at the instance of certain West-end shopkeepers (who believe in fashion rather than economy), had agreed to make with the St. James's and Pall Mall Electric Light Company, to the great expense connected with which ratepayers in the gas-lighted parts of the City of Westminster will have to contribute. The Alderman was careful not to refer to the amount of incandescent gas lighting that the Westminster City Council have in their area, even in the new thoroughfares of Kingsway and Aldwych (for the lighting of which they had the choice of gas and electricity, and chose gas), nor of the remarks made by prominent members of the City Council when the above contract was under discussion, and the tenor of which is found in the observation of Mr. Spencer-Smith, the Chairman of the Works Committee, "that he favoured gas in preference to electricity." As to Battersea, the electric lighting concern is a municipal property that (we have not figures to last March at hand) in the year ending March, 1904, failed to pay its way. This is a sufficient answer to the extension of public electric lighting there, at an estimated cost of £15,140. Perhaps the passing of this sum would not have been so readily acquiesced in if it had been proposed after last Saturday night's experience, when, for an hour or more, a part of the district of Battersea was darkened by a partial failure of the electricity supply, and the tradesmen in important thoroughfares were under the necessity of carrying on business by candle light. How does Alderman Miller's argument as to crowded thoroughfares apply to Saturday night in Battersea?

Sentiment and patience are exhaustible quantities where financial extravagance are concerned. To both, however, Alderman Miller appealed in his peroration—and for what purpose? That the ratepayers' pockets may be still further drawn upon, in order that the Alderman may have the honour of presenting a healthier financial statement for the Electricity Department. Who is telling "fairy tales"?

Associated Commercialism.

In any honest endeavour for advancing the interests of the gas industry, it is a pity that dissension from the means employed should in any way be allowed to interfere in giving it fair trial. The Editors of our American contemporaries "Progressive Age" and "Light" have got to loggerheads over the subject of assisting commercialism in the gas field; and we have no desire to add fuel to the flames. We may, however, be permitted the expression of an opinion (in view of the position that has been taken up in these columns) that we do not think "Progressive Age" has justified its hostile attitude, but, on the contrary, has furnished by its last article—the sequence of the views within which we are unable to trace—sufficient reason for giving those responsible for the commercial side of the work of gas undertakings opportunity for organized conference and extension of knowledge on the hundred-and-one matters which more immediately concern their work in developing business between their respective companies and the residents and manufacturers in the district of supply. It will be remembered that the Editor of "Light" (Mr. L. S. Bigelow) was instrumental, through the pages of his paper, in bringing about the formation of a National Commercial Gas Association; and, at the last meeting of the Pacific Coast Gas Association, he read a paper on the subject, in which he suggested that the gas engineers' national organization and the members of the Commercial Association should hold their annual meetings at the same time and place, and that a part of the time should be devoted to a joint conference on subjects in which both are interested.

We have already pointed out that, in the majority of cases in this country, it is the administrative rule that the engineering and management—right from manufacture to consumer—should be under one responsible head, and that head is the officer who, also as a rule, is a member of one or more Gas Associations. This being so, there is less need for a special organization for dealing with commercial questions. But, at the same time, we can well understand that for those directly in charge of the commercial business of a gas undertaking, there are many matters which may be profitably discussed with experienced colleagues, but with which it is unnecessary to trouble gas engineers when assembled for the discussion of technical matter. The suggestion for united conferences at the annual meetings between the engineers and the managers of the commercial departments of gas undertakings, completely squares with the view of "Progressive Age" that it is well for the officials of the different departments to rub shoulders with each other; and therefore it is not easy to see why there should be any vehement opposition to securing that which is desirable, simply because the means, acceptable to those chiefly concerned, do not accord with the Editor's view. He does not appear to have taken into consideration that the men of the commercial department could more profitably spend their whole time in conference with their own business colleagues than by sitting idly listening, unqualified to fully appreciate the subject or to usefully contribute to debate, while engineering and manufacturing questions are undergoing critical examination. The separate plan, with joint conference during a part of the annual convention, is the one that without doubt will give the maximum benefit; and it is one that, were conditions in this country similar to those of America, we should distinctly advocate. For there is within the plan, the opportunity for developing individuality and putting edge to the appreciation of responsibility; and whatever is devised that will develop the best there is, no matter whether it be in chief or subordinate officials, the better for the undertakings they serve. It is not the stop-at-home man, nor the man who is always chained to his chief and not allowed to explore on his own behalf, whose business ideas and methods get the largest amount of cultivation and expansion. Those are the men who often fall into ruts, and get what is commonly called old-fashioned. But as to the opposition of the "Progressive Age," if we had not read the head and tail of the last onslaught on the National Commercial Association scheme, and had we not known previously something of the views of our contemporary on the subject, the greater part of the article would have left us somewhat bewildered as to the Editor's attitude. The whole of the vagueness in what precedes may be excused in view of the admission that is but ill-concealed in the closing words of the article, that the whole of the Editor's opposition is at present unjustified. It is written: "However discouraging we may "seem in our views relating to commercialism, its advocates "have the privilege of trying it, for knowledge gained by "experience is certainly the most convincing." With this we are most cordially in agreement.

Ill-Advised Gas Legislation in New York.

It will doubtless be in the recollection of many of our readers that a long investigation took place in the early months of the year into the condition of the gas and electricity supply of New York City. It afforded the newspapers a good opportunity for indulgence in the display of sensational head-lines and funny outline sketches for which they have long been noted, and in which English journalists are not far behind them. The outcome of the inquiry was the passing of what is generally known as the Stevens Act (from the fact that Mr. F. C. Stevens, a member of the Senate, presided over the deliberations of the Investigation Committee) and the constitution of a Gas and Electricity Commission. One effect of the new legislation, which became operative on the 1st of July, was to restrict to 2½ inches the pressure at which gas was to be supplied. This limitation was insisted upon in spite of the objections raised by technicians of extended practical experience—among them being Mr. W. H. Bradley, the Chief Engineer of the Consolidated Gas Company, and Dr. A. C. Humphreys, the Principal of the Stevens Institute of Technology, and a member of the firm of Messrs. Humphreys and Glasgow—and in referring to it at the time we said that a little experience would show it to be futile. The use of the word "little" has been amply justified. No sooner did the gas companies proceed to comply with the law than complaints began to be made of inadequate supplies of gas owing to the low pressure. The position is well described by the interesting communication from a correspondent in New York which appears in another part of the "JOURNAL" to-day. He shows how the complaints received by the Gas Companies in Manhattan rose from 7223 in August, 1904, to 11,426 in the corresponding month this year, or an increase of 4203; and in the first ten days of September, from 2561 to 4177, or 1616 more. In some of the densely populated portions of the city, candles and lamps have had to be resorted to in private apartments, and storekeepers have had to close earlier than usual, owing to lack of sufficient gas—not through any inability on the part of the Companies, due to inadequate plant, to furnish it, but simply and solely because they are hampered by restrictive legislation. We quite agree with fixing a minimum pressure, as is done on this side of the Atlantic; but to limit the maximum to 2½ inches, and to penalize a company to the extent of $1000 for exceeding it, seems to us to be imposing a totally unjustifiable burden upon them. "The question of gas pressure," as Mr. Bradley well puts it in the communication referred to "is the simple one of demand and supply; and, within reasonable limits, it is capable of regulation. But the narrow margin allowed by the Stevens Act renders strict compliance with the law absolutely impossible." Some of the Companies have already rendered themselves liable to the penalty; and proceedings will probably be taken to recover it. It is to be hoped that such evidence will then be adduced as will lead to an amendment of this impracticable law. In London, the Gaslight and Coke Company have during the present year supplied gas at an average pressure of 3 inches; while on the 24th of March, the South Metropolitan Company actually gave 5·1 inches at one of the testing-stations. They have done this because their customers require it; and they are thanked—not fined—for so far exceeding the statutory requirements of 6-10ths and 1 inch. The newly constituted Commission in New York are now getting into harness. Let them show their care for the interests of the gas consumers by untying the hands of those who have to supply them with what has now become a necessary of city life.

The Lesson of the Longridge Explosion.

It will be seen, by the report which appears elsewhere, that the Jury returned a verdict of "Accidental death" in the case of the two victims of the boiler explosion at the Longridge Gas-Works on the 28th ult., of which particulars have already appeared. In addition to this fatality, Mr. Lancaster, the Manager of the works, sustained serious injury, from which we are glad to learn he is now gradually recovering. The boiler was used in connection with the sulphate of ammonia plant; and as Mr. Herbert Porter, one of the District Inspectors under the Alkali, &c., Works Regulation Acts, was present at the inquest, we shall look with keen interest for his report, or any other official pronouncement, on the accident. Meanwhile, it may be pointed out that the verdict was not unaccompanied by a rider; the Jury expressing the opinion that sufficient care had not been taken to see that the steam outlets were kept from corroding, and that there should be some arrangement to show the pressure. They were almost compelled to add these remarks, in consequence of what had been stated during the inquiry. The pipe connecting the still with the saturator, on being opened, was found choked up with hard ammonia; and the Board of Trade Inspector, and his colleague from the Factory Department of the Home Office, both came to the conclusion that this obstruction was the cause of the accident. The Coroner condemned the so-called "safety" pipe which did duty for a safety-valve, as being but a "crude sort of thing," and just as liable to become choked as the other pipe. Of course, it is very easy to be wise after the event, but a thought naturally arises as to why the Manager was satisfied to work with a boiler unprovided with a safety-valve, and rely upon his "crude" substitute for it. Doubtless regularity of working and immunity from accident led to over-confidence in it, which a cruel disaster has now dispelled. It is a hard lesson; but it will be a useful one if it leads to the abolition of any similar "crude" arrangements which may be in use in other gas-works. The cost of a safety-valve or a pressure-gauge is as nothing in comparison with the life which its use may be the means of preserving.

Corporation Thrift Schemes.

Just at this somewhat significant period of the year, the Oldham Borough Surveyor has, upon the instructions of the Town Council, been seeking information as to what other towns are doing, or intend to do, in the way of initiating thrift or superannuation schemes for their employees. It is not stated that the Oldham Corporation workers stand in any special need of lessons in thrift; and one would imagine they would be at least as well able to put by for old age and emergencies as those of the ratepayers who are not fortunate enough to fill public positions. Exactly what the truth of the matter in Oldham may be, however, it is not necessary to inquire just now, as no definite proposal has as yet been brought forward. But it is possible from the statistics got together by the Surveyor to see what other towns are doing in this direction; and it seems that there are nearly a dozen Corporations having thrift and superannuation schemes in operation, while in more than as many other cases statutory powers have been obtained. In Manchester, there is a compulsory fund (to all new officials earning over 30s. a week) providing for retiring allowances; the members paying 3¾ per cent. on their wages and the Corporation 1¼ per cent. There is a superannuation fund in Liverpool, to which the men contribute 3 per cent.; while the Corporation undertake to make good any deficiency. In connection with the Glasgow Tramways there is a fund providing for pensions and sickness and death allowances; the payments by members on wages being from 3d. to 6d. per week, and the Corporation adding one-half the members' contribution and 1d. per week per member to superannuation. There is a superannuation fund at St. Helens, optional to old officials and compulsory to new ones—the members and the Corporation contributing equally; while at Ashton-under-Lyne there exists a similar scheme (but applicable to workmen as well as officials) in regard to which no mention is made of a grant by the Corporation. At Croydon there is a superannuation and provident fund, open to all employees who receive less than £500 a year; the Corporation and the men contributing like amounts. The superannuation fund at Birmingham is confined to officials and others receiving 40s. per week and over, and workmen on application. In the former case, equal amounts are paid by members and by the Corporation; but for workmen receiving less than 40s. per week, the contribution is provided out of the rates. There is both a superannuation fund and a thrift fund at Bootle, to which the members and the Corporation subscribe equal sums. At West Ham, pension and compassionate allowances are granted to old and disabled workmen; and, as one would expect of so "progressive" a place, the payments and contributions are provided for entirely out of the general district rate. It is urged by the Surveyor that the Corporations concerned are equally gainers with the men by the adoption of such schemes, in the better and more zealous service which they promote on the part of the servants. There must, however, be very many ratepayers who regard with envy the lot of those fortunate municipal employees towards whose wages and pensions they are called upon to contribute. Where

Corporations subscribe to the funds, it is fair to expect that the schemes shall "pay," just as the profit-sharing arrangements of companies are called upon to do.

The Duty of the Ratepayer.

The members of the Imperial Industries Club—whose object is the promotion of social and business relationship between representative commercial and professional industries—visited Liverpool a few days ago; and the resultant banquet was made the occasion for a discussion of that well-worn topic municipal trading. The matter was, of course, viewed from several different standpoints, and all the familiar figures relating to the growth of local debt and of the rates were quoted. There is no need to recapitulate these figures here; but it is necessary to keep them before the eyes of the general body of ratepayers, and discussions like the one under notice do much good in this direction. It may be taken for granted that the larger ratepayers are fully alive to the seriousness of the situation created by the ever-increasing claims upon their pockets to satisfy the demands of the local governing bodies; but very unfortunately they are in many cases companies, and so have no voice in the spending of the money which they are called upon to contribute. It is therefore the enormous body of small ratepayers that must be looked to—for the present at any rate—for assistance; and in this category must, of course, be included those who pay their rent and rates in one sum to their landlords. Under existing conditions, it is difficult to get the latter class of people to understand how they are affected by the financial schemes of their particular local authority; but, as the member who opened the discussion said, it must be made quite clear to them what proportion of the sum paid by them is for rent, and how much for the rates. The only way to satisfactorily attain this end is by making every householder pay his rates direct; and perhaps, in spite of the obvious difficulties, it may not be too much to hope that some day this may be accomplished. If it were done, and the gas, water, railway, and other companies were permitted to have a voice in the raising and spending of the rates, much cause for dissatisfaction would be removed. At the same time, it must be admitted that those who have votes and are able to see exactly how their rates rise do not take nearly so much interest as they might do in municipal affairs. As Mr. Harmood Banner, of Liverpool, remarked, the average ratepayer is carried away by political questions in a manner which prevents him from giving proper attention to the spending of the rates; and this is not at all as it should be. If, as is no doubt the case, there are many directions in which the outlay of local governing bodies must necessarily tend to increase, there is all the more reason for strict supervision in directions in which expenditure can well be avoided. This supervision it is the duty of the ratepayer with a vote to exercise. The Imperial Industries Club will have performed a good work if they succeed in inducing him to take a more serious view of his responsibilities, and perhaps an even better one if they can assist in removing the injustice by which companies are deprived of a voice in municipal affairs.

An Electricity Undertaking's "Profit."

A healthy interest in the working of the municipal electricity undertaking is being displayed by the citizens of Bristol, and quite a brisk controversy is in progress in the columns of one of the local newspapers as to the precise meaning to be attached to the Electrical Committee's accounts, especially with regard to the profit which is shown in them. Some of the writers are so sceptical of what the Committee call their success, that they deny the existence of any profit beyond a trifle of £1345. All the rest of what is claimed as profit on the twelve years' working is said to be "a mythical profit transferred to a mythical reserve fund." We must leave the Committee to settle with their critics this question of the reality or otherwise of their balance. So far as we can see, however, the ratepayers of Bristol have not gained much by this particular piece of municipal trading. If any profit has been made, it has certainly not gone to the relief of the rates. On the other hand, in the earlier years of the undertaking's history, when there was no pretence of profit about it, £13,904 was taken from the rates to make ends meets. To this extent, then, the ratepayers are actually losers by having the electricity works under public instead of private control. Nor is this all. Mr. John Phillips, the Secretary of the Bristol Gas Company, in a letter to the newspaper, calls back the controversy to the point whence it set out—namely, that of the extravagant price which, under present circumstances, the ratepayers have to pay for public lighting. Mr. Phillips does not draw a comparison between the cost and efficiency of gas and electricity, and show how much cheaper the city could be lighted if gas were generally used. This has been already done, and done effectively, by Mr. Dix, the Chairman of the Gas Company. The point made by Mr. Phillips is that the Electrical Committee are charging for public lighting a good deal more than the minimum price at which they are actually supplying electricity. For the past year, the average price to private consumers of electricity (power) was, says Mr. Phillips, 1·24d. per unit. The price charged for public lamps is 2·84d. per unit, or more than double. The difference would be greater if the comparison were with the lowest price charged to any consumer. Why, he pertinently asks, should not the Electrical Committee be under the same obligation as the Gas Company to supply the public lamps at the lowest price charged to any consumer, whether the gas be used by him for lighting or any other purpose? And the answer he suggests is that it is because the attitude of the Corporation is determined, not in the interests of the ratepayers, but with a view to helping the trading in which they engage. It should, however, interest the ratepayers of Bristol to know that if the Electrical Committee were under the same conditions as the Gas Company, the charge for the electric lamps for public lighting for the past year would have been £4330, instead of £9918. The ratepayers, therefore, contributed last year in this way £5588 towards the "profit" which they do not get.

Midland Association of Gas Managers.

The members of the Association will—under the presidency of Mr. T. Berridge, of Leamington—assemble for their autumn meeting on Thursday of next week, at the Grand Hotel, Birmingham. The programme just sent out by the Hon. Secretary (Mr. Charles Meiklejohn) indicates a busy time. There is to be a discussion on the paper presented by Mr. Henry Fowler, of Derby, at the May meeting (see "JOURNAL" for May 23, p. 50c), on the "Painting of Gasholders." Mr. Thomas Glover is going to describe the "Reconstruction of the Norwich Gas-Works," and illustrate the subject by lantern slides. Mr. J. H. Brown, of Nottingham, will be giving a paper on "Coal Testing," and Mr. George Helps, of Nuneaton, will bring forward the topic of "The Question Box." The members will dine together after the meeting.

Manchester and District Junior Gas Association.

The seventh annual general meeting will be held on Saturday, at the Exchange Hotel, Manchester; and it will be followed by a smoking concert. We learn from the Secretary (Mr. Alfred L. Holton) that the lectures on "Gas Engineering" by Mr. F. R. Hartley, which the Association were instrumental in instituting three years ago in the Manchester School of Technology, are being continued; and the members are strongly advised to avail themselves of this opportunity of extending their knowledge of construction. Classes in the chemical branch of "Gas Manufacture" are also held in the school, by Mr. W. H. Buckley and Mr. F. S. Sennatt. Mr. Holton has sent us a catalogue of the books in the Association's library, which is under the care of the school. It is open daily; but members unable to attend personally can have books by post. The collection consists mainly of volumes of the "Transactions" of the Institution of Civil Engineers; but there are also works dealing specially with gas subjects.

The Lighting of Art Galleries.

Among Art Notes and News, the "Liverpool Courier" makes the following remarks with regard to the lighting of art galleries: "The problem of successfully lighting art galleries has for years exercised managers of such institutions. The ordinary open gas-light is undesirable for many reasons, the chief of which is its deteriorating effect upon the works it is employed to illuminate. Electricity in the arc lamp is too cold; and the liability to flicker and to cast strong shadows makes it of doubtful utility for the purpose, while the incandescent lamp has not been an unqualified success. The nearest approach to perfection is to be seen at the Atkinson Art Gallery, Southport, where an installation of gas lighting on an improved system is now being introduced. The gas-burners, enclosed in large opaque globes, which in turn are screened from the eyes, are placed on a pipe running down the centre of the galleries, a few feet from the roof; each cluster of jets being only a short distance from its neighbour. The result is that the rooms are flooded with a soft, steady light, which illuminates the pictures with all the brilliance of daylight, and without casting the slightest shadow. Southport's Gas Engineer, under whose direction the work has been executed, can be heartily congratulated on an unqualified success; and our local Arts Committee will do well to inspect Southport's system."

GAS ACTS FOR 1905.

HAVING completed in last week's issue the notice of the salient features of the Acts referring to the Gas Companies who applied in the past session for incorporation and statutory powers, the Acts of those statutory Companies who have obtained extended powers are next brought under review.

The Croydon Gas Act consummated the dissolution and transfer of the Caterham Gas Company's undertaking as from July 1 last. In the preamble, it is stated that the issued capital of the Caterham Company consisted of 2500 ordinary shares of £10 each, all fully paid, and entitled to a maximum dividend of 10 per cent.; and 500 preference shares of £10 each, all fully paid, and entitled to a dividend of 5 per cent. per annum. The sum borrowed was £6250, bearing interest at 4 per cent. The consideration for transfer is the allotment to the holders of shares of £5000 of "D" stock, to rank *pari passu* with the "D" stock authorized by the Croydon Gas Act, 1904, and £25,000 of new ordinary stock to be called "E" stock. The holders of "E" stock are to be entitled to a fixed maximum dividend of 10 per cent. per annum, provided that if in any half year the dividend upon the "B" stock of the Company shall be at a less rate than 10 per cent. per annum, the "E" stock for the purposes of dividend shall rank *pari passu* with the "B" stock. The holders of debenture stock come under the same rights and privileges as if the debenture stock had been issued under the powers of the Croydon Gas Act, 1904. The Act provides for the increase of the number of Directors from seven to eight, with a subsequent reduction to seven, by the old Directors of the Caterham Company co-opting one of their number to serve on the Croydon Board, and by the first vacancy occurring on the Board of the Company in any manner other than by retirement by rotation not being filled up. In addition to the uniting of the areas of the two Companies, the district is to be extended by the inclusion of the parish of Woldingham, and a portion of the parish of Godstone; and the rights of the Redhill Gas Company in any part of the district defined by the Act are determined. The price of gas in the Caterham district (other than under special contract) is to be, for a period of seven years from the date of transfer, "not more than 8d. nor less than 4d., and after the expiration of such period, shall never be more than 4d. in excess of the price charged for the time being to such persons within the limits defined by the Croydon Gas Act, 1866." In Coulsdon, the price is to be the same as in Croydon. The Company are given power to raise additional capital not exceeding in the whole £36,000, by the creation and issue of "D" stock to rank *pari passu* with the existing "D" stock. Authority is also given to first offer new issues of stock created under the Act to the consumers and employees "at as near as may be the average market price in the month immediately preceding such offer, provided that in no case shall the price at which such stock shall be offered be lower than 5 per cent. below such average market price." In respect of the capital allotted to the Caterham shareholders, the Company may borrow (inclusive of £6250 already borrowed and charged on the Caterham undertaking) up to one-third the nominal amount of such capital, and in equal proportion on the additional capital. Interest on borrowed money is specifically limited to 5 per cent. Discounts and rebates are restricted to 20 per cent. upon the price charged to private consumers. This is a subject to which reference was made in the editorial columns of the "JOURNAL" last week, and upon which Mr. Charles Hussey, the Chairman of the Croydon Company, had something to say at the last meeting of the proprietors. The Directors are now invested with power to determine the salary of the Secretary. The agreement between the Croydon and Caterham Companies is appended to the Act. In it provision is made for the payment of £1500 to the Caterham Directors jointly for loss of office, and of £1000 compensation to the Engineer and Secretary of the Company (Mr. D. H. Anderson), and two years' fees to Mr. Benwell, the Auditor. [*Messrs. Blyth, Dutton, Hartley, and Blyth, Parliamentary Agents.*]

Although the London Gas Act is not a Company-promoted measure, it applies to the London Gas Companies, and so properly falls here rather than in the notices yet to come of the Acts referring to the undertakings of local authorities. The Bill was, as it is almost superfluous to remark after the considerable attention it has received in these columns, a promotion of the London County Council; but, as the outcome of the investigation before the Committees of Parliament, the Act is a totally different thing from the Bill as introduced. Running over the provisions, there is first the much-vexed question of testing for illuminating power. In this regard, the Gas Referees are to prescribe the burner for testing the illuminating power of the gas, and the chimney (if any) to be used with the burner. The burner so prescribed is to be of such a pattern (not being an incandescent or similar burner) as shall be practicable for use by the consumer; and the burner and the chimney are to be the most suitable for obtaining, and in making the test shall be used so as to obtain, from the gas, when consumed at the rate of 5 cubic feet an hour, the greatest amount of light. Consumed at the rate of 5 cubic feet, the gas is to produce a light equal to 16 candles in the case of the Gaslight and Coke Company and 14 candles in the case of the South Metropolitan and Commercial Companies. If on any one day the gas supplied by a Company at any testing-place is of less illuminating power to an extent not exceeding 1 candle than it ought to be, the average of all testings made at such testing-place "on that day and on the preceding day, and on the following day, shall be deemed to represent the illuminating power of the gas on such one day at such testing-place." Gas examiners are, under the instructions of the Gas Referees, to make testings of the gas supplied for the purpose of ascertaining the calorific power, the purity as regards sulphur other than sulphuretted hydrogen, and the illuminating power by means of a flat-flame burner of the best available pattern; but these tests are to be for information only. Copies of the reports made under the provisions of this section are to be delivered to the controlling authority, the Gas Referees, the Chief Gas Examiner, and to the Company concerned. For these testings, Sundays are specifically excluded. Gas is not to exhibit any trace of sulphuretted hydrogen when tested in a mode to be prescribed by the Gas Referees, which mode is not to be more stringent than that prescribed in Schedule A of the Gas-Works Clauses Act, 1871; and section 15 of the Act of 1880 is to apply accordingly. As is also well known, the Companies are not to be liable to any forfeiture by reason of the presence in the gas supplied of sulphur impurities other than sulphuretted hydrogen; this abolishing the necessity for lime purification. It is provided that the service-pipe to a testing-place shall proceed to it direct from the main; and there is to be no branch pipe or tap connected in any way to the service-pipe outside the testing-place, except that the Company may provide a tap on the service-pipe at a point outside, and as near as practicable to the testing-place, for use in case of emergency only—the tap to be sealed by, or on behalf of, the controlling authority as occasion may require in such manner that the tap cannot be used or turned without breaking the seal. Access to the tap by the controlling authority is to be given at all reasonable times. Power of appeal by the Companies to the Chief Gas Examiner against prescription or certification of the Gas Referees, is given. Sunday testing is not to be obligatory on the controlling authority; and where no Sunday tests are made, the provisions relating to testing are to be read and construed as if Saturday were really the day preceding Monday. If a Company think themselves aggrieved by any report of a gas examiner, they may appeal, within seven days, to the Chief Gas Examiner, whose decision, after hearing the parties, is to be final and conclusive. If the Chief Gas Examiner certifies that the default of the Company is not substantial, or not due to the careless conduct of the Company, or their servants, proceedings are not to be taken before a Petty Sessional Court for the determination of the amount of the forfeiture to be paid by the Company; but, upon the request of the controlling authority, the Chief Gas Examiner may determine the amount of the forfeiture to be paid. There are other minor sections in this relation, together with provision for a penalty in case of neglect to comply with the prescriptions of the Gas Referees. The costs of obtaining the Act (which must have been considerable) are to be defrayed as payments for general county purposes within the meaning of the Local Government Act, 1888. [*Messrs. Sherwood and Co., Parliamentary Agents.*]

The Rhymney and Aber Valleys Gas and Water Act is the result of the introduction of a Bill by the Company in their extremity in regard to the obtaining of further capital. To procure it, the Company are authorized by the Act to attach a preferential dividend not exceeding 5 per cent. per annum to the balance, or part of the balance, of the unissued ordinary capital authorized to be raised by the Act of 1898, to an amount not exceeding £100,000. But the Company may, when the profits on the undertaking are sufficient to pay a dividend in any one year of 4 per cent. on the ordinary share capital already issued at the passing of the Act, extinguish the preferential right to dividend on the shares, which will thereupon be converted into ordinary shares. The clause of the Company's Act of 1898 providing that separate accounts shall be kept for the gas and water undertakings, is repealed, and the two are now to be treated as one undertaking. [*Messrs. W. & W. M. Bell, Parliamentary Agents.*]

The Shepton Mallet Gas Company have—the District Council having concurred in the promotion of the Bill—secured the Act empowering them to supply electricity within the limits of gas supply. The gas-works lands may be utilized for the generating station; and by agreement the Company may purchase an additional 2 acres of land. The gas and electricity works and plant, however, are to be kept quite separate. The usual powers applying to electricity undertakings are accorded the Company, who are, within three years after the passing of the Act, to lay sufficient and suitable distributing-mains in a scheduled area, and thereafter in every street as required. The Board of Trade, however, are invested with authority to extend the period for such time as they think fit. The prices the Company may charge (where the charge is by the actual amount of energy supplied) may be, for any amount up to 20 units, 13s. 4d., and for each unit beyond 20 units, 8d. This is to be the maximum price except to public lamps; and discounts may be allowed up to 20 per cent. For the purposes of the Act, £9000 additional capital may be raised; and the borrowing powers may extend to one-third of the amount issued. The dividend is not to exceed 7 per cent.; and the sliding-scale is applied. Taking the standard price at 6d. per unit, farthing variations in price will carry changes in dividend of 5s. per cent. The gas and electricity capital and other accounts are to be distinguished and kept separate. [*Messrs. Seymour Williams and Co., Parliamentary Agents.*]

In view of the passing of the London Gas Bill, the South Metropolitan Act represents only a small part of the original Bill. Power is given to purchase certain specified lands in Camberwell; the London Building Acts are applied; and a clause extends exemption from liability to landlord's distress for rent to all gas engines, apparatus, fittings, and appliances let by the Company on hire to their consumers, and bearing a distinguishing metal plate or brand. Engines, &c., let on hire, though fixed to the premises, are to remain the property of the Company. The other provisions of the Act are of an ordinary character. [*Messrs. Dyson and Co., Parliamentary Agents.*]

The South Suburban Gas Act is also a much shortened representative of the original, owing to the removal of the illuminating power clauses under circumstances with which readers are cognizant. The clause of greatest importance is that which relieves the Company from liability to forfeiture by reason of the presence in the gas supplied of sulphur impurities other than sulphuretted hydrogen. Other clauses provide for fittings not being subject to distress; and engines, &c., though fixed to premises, are to remain the Company's property. Other clauses are of an ordinary character. [*Messrs. Dyson and Co., Parliamentary Agents.*]

The Walker and Wallsend Gas Act gives the Company power to compulsorily purchase upwards of 20 acres of land for manufacturing purposes, and 10 acres by agreement. The uses to which the lands may be put are defined. [*Messrs. Durnford and Co., Parliamentary Agents.*]

By the Western Valleys (Mon.) Water and Gas Act, the sections of the Acts of 1891 and 1892 providing for separate capital and other accounts for the gas and water undertakings are repealed; and borrowed money is made a charge on both the water and gas undertakings. The share capital authorized to be raised prior to the passing of this Act, and now made applicable to both the gas and water undertakings, is defined at £60,000; and the Company are authorized to raise any balance of the unissued share capital not exceeding £20,280. With the exception of the portion of the capital raised as preference shares or stock, upon which a dividend of 5 per cent. is fixed, the dividend on the share capital may be at the rate of 10 per cent. per annum. In respect of the capital of £60,000, the Company may borrow £15,000; but no part thereof shall be borrowed until 50 per cent. of the value of the shares or stock at the time issued, together with the premium (if any) realized on the sale, shall have been duly paid up. [*Messrs. W. & W. M. Bell, Parliamentary Agents.*]

The Wrexham Gas Act extends the limits of the Company's supply to certain parishes or townships in the rural district of Wrexham and the county of Denbigh and to part of the parish of Gresford. The chief object of the Company in going to Parliament was to arrange for the conversion and consolidation into one class of stock of all the Company's existing consolidated stock and ordinary shares; and on Jan. 1 next there will, by virtue of the Act just passed, be distributed among existing proprietors of stock £200 of ordinary 5 per cent. stock for every £100 now possessed, and in proportion for any less sum. The holder of every ordinary share will receive £14 of ordinary stock. The Company may raise additional capital not exceeding in the whole £40,000. Including the sum of £16,250 already borrowed, the Company may borrow one-third of the nominal amount of the ordinary stock into which the existing consolidated stock and the share capital of the Company is consolidated, together with one-third part of the additional capital actually issued. A renewal fund is provided for; the Directors may determine the salary of the Secretary; 5 acres of land may be purchased by agreement; and discounts up to 10 and 15 per cent. for prompt payment and large consumption may be allowed. The Company in their Bill only asked for power to grant discounts within the limit of 20 per cent. In reference to the price of gas for public lighting, the words "for lighting purposes" have been inserted after the word "consumer" in the section of the Company's Act of 1870 applying to the matter; but the price for gas to the public lamps is not at any time to exceed 2s. 3d. per 1000 cubic feet, unless in the opinion of an Arbitrator agreed upon by the Company and the Corporation, or failing agreement appointed the Board of Trade, it is reasonable that such price should be increased. The Company are now to be known by the curtailed title of the Wrexham Gas Company. [*Messrs. Martin and Leslie, Parliamentary Agents.*]

A Popular German Pamphlet on the Value of Gas.—In previous issues of the "JOURNAL" favourable reference has been made to a little pamphlet entitled "Kein Haus ohne Gas" (No House without Gas) which was originally prepared under the auspices of the German Association of Gas and Water Engineers, and is extensively employed in Germany and elsewhere by canvassers and others. The author of it is Herr F. Schäfer, one of the Engineers of the German Continental Gas Company, and his work has been so much appreciated that a new edition, each of 25,000 copies, has been called for in Germany every year since 1902. We have received a copy of the latest (the fourth) edition, which we have no doubt will be as quickly disposed of as its predecessors. The booklet has been translated into several languages; and arrangements have been made for a new edition in French to be produced by the Syndicat Professionnel de l'Industrie du Gaz in Paris, of which M. Delahaye is the General Secretary.

ELECTRIC LIGHTING MEMORANDA.

The City Lighting—Vague Estimates—Mr. Swinburne Confirms the Cheapness of Incandescent Gas Lighting—After-Dinner Fancies—Cost of Electrical Cooking by a Lady Expert.

THE commotion that the displacement of a number of electric arc lamps in the City streets has caused in electrical circles shows no abatement; and there has been a great sitting down to calculations of cost to ascertain what can be done by new arc lamps in conjunction with special favours to the public lighting. The Fleet Street lighting is the favourite for attack; and little is said about the high-pressure lighting in Queen Victoria Street. The care with which the subject of incandescent gas lighting has been studied by the writer of "Notes" in the "Electrician" is evinced by a statement that Fleet Street is now lighted by "thirty-four pairs of high-pressure incandescent gas-lamps." Fleet street is lighted by nothing of the kind. It now contains 34 lamps, each fitted with "C" burners, consuming gas at the ordinary district pressure, and not high pressure. This is not an unimportant correction; and it is to be hoped that our contemporary will put the matter right, so that their readers may not be further deceived. The "Electrician" goes on to quote the estimates of certain electrical engineers for lighting Fleet Street by twelve "modern" or "flame" arc lamps, which naturally it is believed by them would give a far better illumination. But there is only one of the estimates that accords fairly full information as to how the costs are arrived at, and that only states that the lighting would "probably" be "five or six times as efficient as at present." Estimates of electricians where costs are concerned have the reputation for being under rather than over stated; and *vice versâ* where illuminating power is concerned. One engineer estimates that the street could be illuminated by twelve "flame" arc lamps for £204 per annum, including repayment of the interest in thirty years, which is rather a long term. A second engineer quotes £192 per annum. Another mentions £198; and the makers of the "Oriflamme" arc lamp peg in a good advertisement with £119 5s. as the "cost of electricity, carbons, and labour," taking current at 1d. per unit. How the prices are made up in three out of the four quotations we are not told, and nothing definite is stated as to illuminating power. In Blackfriars Bridge approach, there are four of these jumping "flame" arc lamps, irritating the eyes of everybody who happens to glance at them; and three times the light that they are giving in that concentrated space is supposed to be sufficient for the lighting, from twelve separate points, the whole length of Fleet Street! High local illumination with dark stretches between would be the result of such a scheme in a street some 30 to 35 feet wide; whereas the 34 incandescent gas-lamps, costing £207 per annum (ordinary and not a cut price), distribute fairly the whole of their illumination along the street. For efficient street lighting, few centres of high illuminating power cannot possibly afford so equal a distribution of illumination in the roadways as a greater number of centres of lower illuminating power. Great centres of light may look attractive, but attractiveness is not always synonymous with efficiency. It is not bounce and mere estimate that will undo for the electrical industry the mischief that experiences in the City have caused them, but demonstration of actual street lighting with definite and detailed figures as to what electrical undertakings are prepared to do the lighting for according to sample—giving the uniform distribution, the steadiness, and the efficiency that the incandescent gas-light has satisfied the City authorities that it possesses. What the electricians are now doing in their fright is the paring down of the expense, in order to try to save the situation; and that paring down in the case of municipal undertakings—works' cost and management charges show it—must bring expense on to someone, either the private consumer or the ratepayer through deficiencies. Perhaps the Electric Lighting Companies supplying in the City will not thank the "Electrician" for publishing the estimates from (in two instances) municipal engineers and a firm of interested lamp makers. The other estimate was from a company engineer who judiciously withholds his name.

Mr. James Swinburne we know to be, anyway in most things, a very truthful person, with an abundant fund of wit, and with very narrow notions of the lasting capabilities of the goods which oppose those that his professional position demands he should cherish. He has been lecturing at Olympia on "Domestic Electric Lighting;" and in one part it was hardly the kind of thing that was expected of him, as it was, coming from an electrician, one of the best possible advertisements that gas could have had for domestic lighting. It was on the important question of price that he told his audience that, without taking into account the cost of the lamps, electricity at 3d. per unit was equal to gas—that is to say, used (as no sensible person now uses it) in flat-flame burners—at 2s. per 1000 cubic feet. But what he went on to say has given offence to one, if not more, of those electrical papers that have been speaking of the comparisons as "absurd" that gas people make on the point of cost of domestic electric lights and incandescent gas-burners, in that he has completely endorsed the calculations. This is his statement, including the little Swinburnianism in the first line:—

> The gas people were very "cocky" because they had invented things they called mantles, which, instead of giving 12 candles for 5 cubic feet per hour, or something of that sort, gave about 18 candles per cubic

foot per hour when new; and the result was that, on this comparison, every 1d. per unit paid for electrical energy corresponded to about 6s. for gas, and thus electricity at 3d. would correspond to gas at 18s. Of course, this comparison was a misleading one; it only applied whilst the mantles were new, and the mantles deteriorated quickly.

The last part of the quotation is not correct, as all users of incandescent mantles who are not fooled into buying trashy makes know full well; and they could give Mr. Swinburne some useful information on the subject before he again tries to spoil the good case for gas by mere hypothesis of this nature. The statement might well apply to incandescent electric lamps; and we do Mr. Swinburne the justice of thinking that he was temporarily confusing the two. Assuming, however, that his misstatement was made in all seriousness, the charge for gas being now generally anything between 2s. and 3s. per 1000 cubic feet, the difference between this and the 18s. gives a very good reserve for replacements and even redecoration of the rooms in which the much vilified gas is used. The 3d. per unit for electricity is not a usual price for private lighting, and there are more than a few places where 6d. is the rule. In such towns, therefore, on Mr. Swinburne's own showing, the cost of domestic electric lighting compares with gas used in incandescent gas-burners at 36s. per 1000 cubic feet. "Absurd," is it? The "Electrician" assumes the right of offering a little palliation for Mr. Swinburne, without submitting any figures to prove the groundlessness of his statement. "He was addressing a sympathetic audience," says our contemporary, "and probably assumed" (supposition on the part of the "Electrician," and supposition alleged on the part of Mr. Swinburne) "that they possessed a full knowledge of these things." If this is so, there was no occasion for the lecture, and Mr. Swinburne was merely trifling with his audience and wasting their time. The lecturer, however, gave his hearers a fine piece of intangible consolation (which is as old as town electricity supply itself, and has not answered its purpose) to throw into the balance against the dearness of their commodity for lighting, by telling them that the amount saved in redecorative work where electricity was in use made it cheaper to take the electric light in the long-run than to use even gas supplied free. If Mr. Swinburne had gone a little farther, we might have heard that the saving by the adoption of the electric light would enable a householder to rebuild his house in a very short time. Some day we ought to have a volume of "fairy tales" from Mr. Swinburne; and, if so, this one about redecoration ought not to be omitted, with a foot-note attached that the estimate has been largely undermined by the fact that every incandescent gas-burner for interior lighting is equal to the displacement of four or five of the old flat-flame gas-burners, and, as the best results can only be obtained from incandescent burners when combustion is perfect, the redecoration argument has sadly lost force.

At last the authorities at Olympia have got to the hearts of the reporters of the Daily Press *viâ* the sure road of gastronomy. The gentlemen of the Press were well regaled, were told what to say to their readers on the question of electrical cooking, and away they went to do the bidding of their hosts, with very insufficient information in their note-books. Mr. E. Cunliffe Owen gave them the cue; and the reporters, looking at the similarity of their statements, faithfully returned the expected thanks for the generous hospitality. The Exhibition authorities carefully overlooked the issuing of invitations to representatives of the gas journals, and, with one of our journalistic friends of the electrical Press, we regret the omission. The dinner was electrically cooked, and cooked by Mrs. Deane, who, unlike most housewives and servants, is certified in magnetism and electricity. If this is an essential attainment on the part of our womankind to cooking by electricity, then this will be a further terrible obstacle to any degree of popularity for the still struggling electrical cooking appliances, which branch of the electrical industry, the "Electrician" regrets, has "made so little advance during the *many* years it as been before the public." Householders who enjoy the cheap conveniences of the gas-stove will smile at the wildness of the statements of the men in the daily papers who wrote the roseate accounts of what electricity can accomplish for the *cuisine*, and at (if the "Electrical Review" will forgive us making use of some of their choice language) the "half-truths" and "half-lies" that the reporters incorporated in their notices. In the London letter to one of our provincial papers, it is stated that "everything was done to a turn, and free from the taint of the gas-stoves." Every day of their lives, these men about town are eating the viands prepared (though they may not be aware of the fact) in gas-stoves, and many of them also in their own houses—unless they all be of the daily lessening percentage of the population who do not provide for their wives and servants the facilities of the gas-stove. If their food cooked by the gas-stove in their homes is not "free from the taint of the gas-stove," then they must have about them negligence in the matter of cleanliness. Any cooking appliance—even electrical—in which cleanliness is not observed will emit disagreeable odour. This tainting and smell (disproved by daily experience in properly ordered kitchens) is the kind of nonsense that the Press representatives were told at the dinner to depreciate gas, and to laud electrical, cooking by in their reports. And they did it. The electrical papers also joined in the chorus; and "Meteor" of the "Electrical Times," whom nothing in this way can abash, solemnly avows that the "atmosphere of the room in which gas cooking was going on" at the Earl's Court Gas Exhibition "was indescribable." Poor "Meteor"! How easily he must be affected; his is a case for the pity of the ladies who enjoyed remaining in that toxical atmosphere from the beginning to the end of the lectures. Many a night in that same hall, while the cookery lectures were proceeding, the difficulty was to find even standing space.

The question of cost, however, is a most important matter. The reporters went away from the dinner satisfied that the cooking of this dinner for 65 persons was about the cheapest thing on earth. Mr. Cunliffe Owen was apparently in very cheerful mood—after the dinner; and the reporters were magnetized by his wit. He spoke of electrical people being able to afford "to smile at the alleged 'victories' of gas;" and "he had no doubts"—this was still after the dinner—"that electricity was destined to wipe gas out of the field." The occasion must be the excuse for this vain boasting. It was Mr. Owen's information, too, that the dinner for the 65 persons had been cooked by the expenditure of 56 units of electricity, which, at 1d. per unit, is equal to 4s. 8d., which is the price of nearly 2000 cubic feet of gas at 2s. 6d., or of (say) a ¼ ton of kitchen coals. Fancy 2000 cubic feet of gas being used for cooking a dinner for 65 persons! The electricians make themselves ludicrous by their outrageous prating. Electricity at 1d. per unit for any domestic purposes is not exactly the common price. It is becoming more common in London where the Power Companies have rudely startled the existing suppliers of electricity. Then, also bearing upon the cost, in one paper we find the not unimportant statement that the "joint was served cold, it having been electrically cooked the previous day;" all information as to why it was cooked the previous day is omitted. We do not notice that it is anywhere pointed out, too, that the cost of fuel for cooking for a large number of persons has no relation with the cost of the fuel required for cooking for an ordinary sized family. The cost of cooking for 65 persons—even by electricity—will, of course, be less per head than cooking for a family of (say) five to ten persons. The 4s. 8d. is called "remarkably cheap." It may be for electricity for 65 people, with a cold joint; but it is not for other classes of fuel, among which gas comes foremost. The pretty after-dinner picture that was painted at Olympia will not be reproduced in daily practice in the household, even when the cost of the apparatus itself comes down to a figure that is within the reach of the ordinary individual, and when the charge for electricity for cooking is universally (if it ever comes to that) 1d. per unit. Nothing appears in the reports that we have seen as to the time occupied in cooking the dinner, nor as to the quantity of food cooked. Housewives, too, will want to know how the electrical apparatus compares with gas in the range of its freedom of applicability to meet the requirements of changes of equally diffused temperature, something as to the reliability and durability of the apparatus, and whether they must keep a coal or a gas cooking-range ready for emergencies, before they will commit themselves to any such uncertainties, *plus* the addition which the electrical people invite them to make to their household expenses. Mrs. Deane's cookery demonstrations, occupying twelve hours a week, draw upon the electricity supply to the extent of 100 units, which at 1d. is more than 8d. an hour, which in turn is the price of 333 cubic feet of gas in the South Metropolitan Company's district. What could be done in the way of cooking with that 333 feet of gas?

In a few weeks we shall be in the midst of the elections of Mayors; and already indications have been given as to who will be chosen to fill the important office of Chief Magistrate. Among these we may mention Alderman T. E. Lowe at Burton-upon-Trent. He is one of the most promising public men in the district, and will be the youngest Mayor in the history of the borough; being only a little more than forty. He entered the Council in 1893, and, after serving on various Committees, was elected Chairman of the Gas and Electric Light Committee in 1899. This position he still holds. In directing these two important undertakings, his aim has been, in the case of the former, to so increase the funds as to allow of reductions being made in the price of gas, while handing over substantial amounts in relief of the rates. Last year £6500 was devoted to this purpose, which was more than the average of the last 26 years. The electric light undertaking has also prospered since the coming Mayor took the chairmanship of the Committee.

We learn from "Engineering Record" that an interstate water suit of a novel character has just been decided by Vice-Chancellor Bergen, of New Jersey. Some time ago the Hudson Water Company made a contract to deliver water from the Passaic watershed in New Jersey to Staten Island, in New York. This contract was attacked as unconstitutional; and this view has been sustained by the Courts. "The constant increase in our population, considered in connection with the unchanging extent of the watershed and the consequent limit of the natural supply of water," said the Vice-Chancellor, in giving judgment, "may justly alarm the State with regard to the future; and a neglect to insist upon its rights in the past, when conditions did not require a strict enforcement of its privileges, works no estoppel, and justifies the restriction of the appropriation of its property." As the owner of the tidal bed of all streams, the State is held to be the owner of all fresh water naturally reaching those beds, and has the right to prevent any impairment of this flow. While it may justly raise no objection to the diversion of the water for the use of its own people, it can prevent such diversion for the benefit of people of another State.

CHEMISTRY OF MANUFACTURING PROCESSES.*

NINE years have now elapsed since the publication of the first edition of this work; and the fact that the whole edition and a reprint have been exhausted shows that the volumes have so far fulfilled the purpose for which they were written. The authors have now, with the assistance of Mr. A. G. Levy, prepared a revised and enlarged edition incorporating the additional knowledge gained during the last few years. Vol. II., which deals with the chemistry of manufacturing processes, has now been published; while Vol. I., dealing with the chemistry of engineering, building, and metallurgy, will shortly be ready.

In considering the volume now published, it must be borne in mind that the intention of the authors is not to give the details required by manufacturers in any particular industry, but to describe generally the various manufactures in such a manner as to enable those connected with any one industry to understand the underlying principles of other manufacturing processes, and to assist them in gaining from the theory and practice of such manufactures, information which will be of assistance to them in their own work. The manufacturing processes dealt with in the book now under review are as follows: Sulphuric acid; alkali; destructive distillation; artificial manure; petroleum; lime and cement; clay industries and glass; sugar and starch; brewing and distilling; oils, resins, and varnishes; soap and candles; textiles and bleaching; colouring matters; dyeing and printing; paper and pasteboard; pigments and paints; leather, glue, and size; explosives and matches; minor chemical manufactures. To cover such a wide range in the space of a single volume, is obviously a matter of considerable difficulty; and speaking generally, the authors must be congratulated on having achieved a large measure of success.

The necessarily condensed style adopted has, however, sometimes resulted in lack of clearness, which will be more particularly felt by those whose knowledge of chemistry is not very extensive, and for whom the book is mainly intended. The work would have been improved by the omission of some portions, and the utilization of the space thus saved in a rather more extended treatment of some of the other processes. Thus, for example, in the chapter on dyeing, the description of the synthetic colouring matters (occupying nearly 60 pages) can, owing to the intrinsic complexity of the subject, only be understood by those having a good knowledge of advanced organic chemistry; and as the few who have such knowledge can readily obtain the information in other works, very little would be lost by the omission of this portion.

In the revised edition a good deal of fresh matter has been added, and the various chapters are brought up to date. In the chapter dealing with sulphuric acid, a good account is given of the "contact" process recently developed for the manufacture of that acid; and in the same way the new electrolytic methods of production of alkali and chlorine products are dealt with in the second chapter. In considering the theory of the formation of sulphuric acid in the leaden chamber process, no mention is made of the views recently again promulgated by Raschig and by Divers. This, however, is very likely due to the fact that the revision of this, the earliest, portion of the book was completed before the papers referred to were published.

The chapter on destructive distillation, which includes the manufacture of coal gas, while it gives, in many respects, a good general account of the subject, has been but little altered in the revision, and contains a number of statements which require correction or modification, and to which attention may therefore be called here. Many of the points mentioned are not of vital importance in connection with the principles of the manufacture; but such matters should either be given correctly or else omitted altogether.

In describing the method of charging and drawing retorts, the attempt to compress recent developments into a few lines has resulted in the following paragraph: "Mechanical charging and drawing are, however, largely used. Retorts set at an angle of 29° to 36° especially lend themselves to mechanical charging and drawing. In West's system, the coal is charged from a trolley run into the upper end of the retort. The coal must be prevented from reaching the lid at the lower end. This is done by inserting a stay—usually a flat iron bar fastened to the mouthpiece. Discharging is effected by an automatic scoop; the slope of the retorts facilitating both charging and drawing." For a collection of inaccurate statements in a small space this is difficult to equal; but in fairness it should be stated that such grave inaccuracy is quite exceptional. A little later, the "foul main" is confused with the main removing the condensed products from the hydraulic main; and it is stated that the function of the latter is "to remove the less volatile portions of the tar and any solid matter, such as already condensed naphthalene and solid carbonacecous matter," from which it would be gathered that naphthalene separates from the gas even in the early stages of cooling independently of the other tarry matters, and that naphthalene can exist in the gas in the solid state at the temperature of the hydraulic main. Again, in discussing the purification of coal gas by oxide of iron, the impression is given that the addition of 2 per cent. of air to the crude gas renders it possible to avoid any changing of the purifying material until it is completely spent; whereas such changing is still necessary, but at less frequent intervals.

The description of the bunsen or air-gas flame is also capable of much improvement, in view of the recent work of Dixon, Smithells, Lewes, Haber, and others; and in some of the statements made, it is not easy to see the authors' meaning, as, for example, in the following: "If arrangements be made to admit more air than two-and-a-half times the volume of gas, the flame becomes smaller and burns with a greenish inner cone, inasmuch as the action of excess of oxygen overcomes the diluting action of the air."

In dealing with the working up of gas liquor, it is hardly correct to say that it is the common practice in England to recover only the volatile ammonia, and to neglect the fixed ammonia; for though this is not infrequently the case with small undertakings, by far the greater quantity of the fixed ammonia is recovered in this country, as on the Continent.

The manufacture of combustible gases other than coal gas is considered in Vol. I and not in the present volume, except for a short paragraph dealing with carburetted water gas as an enricher for coal gas. Some extension of this portion is desirable in view of the large extent to which this gas is now manufactured. Further, though the illuminating power of coal gas is considered, there is no discussion of what is now the more important matter of calorific power and flame temperature.

Among the minor chemical manufactures, that relating to cyanogen compounds is incomplete, especially as regards their recovery from crude coal gas. There is only the merest mention of direct processes for the recovery of ferrocyanides from crude coal gas, and none at all of those for obtaining sulphocyanides, although the method of preparing these salts from spent oxide is described.

The book is commendably free from typographical errors; only one of any importance having been noticed—namely, on p. 269, where it is stated that there are *sixteen* (instead of six) standard sperm candles to the pound. On p. 75, gas "meter" is, as in the first edition, still spelt "metre;" on p. 179, "trymethylamine" occurs instead of "trimethylamine;" and on p. 462, the formula of potassium ferricyanide is given as "K_2FeCy_6," instead of "K_3FeCy_6."

* "Chemistry for Engineers and Manufacturers." By Bertram Blount and A. G. Bloxam. Vol. II. Chemistry of Manufacturing Processes. Second Edition. London: Charles Griffin and Co., Limited; 1905.

THE GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 200.)

ALL last week the Stock Exchange continued to be dominated by the dear-money question. It being settlement week, fresh business would in any event have been liable to restriction in point of volume; but the anxiety referred to helped further to reduce it. Prices fell naturally; but the movement was not always steadily downward, oscillating rather as more cheerful anticipations prevailed from time to time, and then relapsed. The gilt-edged division suffered, of course, and underwent a general set-back. There was a good brisk demand in the Money Market for the various requirements of the time, as well as for the Stock Exchange; and the supply now and then was not too abundant, while discount rates held up very stiffly. Business in the Gas Market had a marked recovery in point of activity, led by the largest issue. Variations in quotation moved somewhat irregularly; the downward movements, notably those of debenture stocks, being to a great extent influenced by the money trouble. In Gaslight and Coke issues, the ordinary was very active and in good demand. The weaker figures of the previous week were quickly left behind; and from 99 (which was marked on Monday) prices advanced smartly to 101, at which figure several transactions were marked. The secured issues were not active, and were very irregular. The debenture stock was depressed to 87 and 88; but the preference was firmer, and marked 111 and 112. The maximum was not dealt in, but was quoted a point easier. South Metropolitan was rather quiet. At first it looked like advancing, and a parcel changed hands at 132⅞; but on Friday, it was done at 131, and the quotation receded a point. The debenture also fell a point, changing hands at 88 and 88¼. Commercials were very quiet. The 4 per cent. was done once at 117; the 3½ per cent., at 114; and the debenture, at 86. The Suburban and Provincial were as quiescent as usual, or even more so. West Ham ordinary realized 106 after a small amount had been done free at 104½. In the London market, there were no movements in quotation; but on the local Exchange, Liverpool "A" and "B" had a further smart advance. Moderate business was done in the Continental Companies. Imperial was steady at from 220 to 221, and the closing bargain was equal to the best of the week; but the quotation was nevertheless lowered the same day. Union was fairly active at prices ranging from 121 to 122½; and a couple of transactions were marked in European fully-paid at 22⅛ and 22¾. Among the undertakings of the remoter world, Bombay was done at $7\frac{1}{16}$, Cape Town ordinary at from $17\frac{7}{8}$ to $17\frac{5}{16}$, and ditto debenture stock at 103½. Melbourne 5 per cent. changed hands at 101¼. Buenos Ayres debenture marked 96¼; and River Plate ordinary was done at from $13\frac{3}{8}$ to $13\frac{3}{4}$. Primitiva preference realized $5\frac{3}{8}$ and 5½, and ditto debenture 97½ and 98¼. Monte Video was done at $12\frac{3}{8}$; and San Paulo at $13\frac{1}{16}$ and $13\frac{3}{8}$.

The closing prices are shown in our Stock and Share List on page 200.

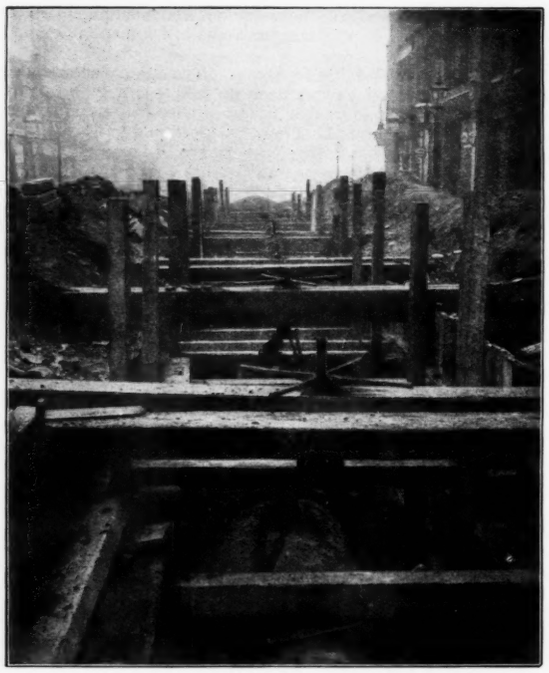
LOWERING A FORTY-EIGHT INCH HIGH-PRESSURE GAS-MAIN.

A STUPENDOUS piece of work in live gas-main lowering has just been successfully accomplished in Theobald's Road, Holborn, in front of, and extending in both directions from, the Fire Brigade Station. Not only on account of the size of the main, and from the fact that it contained gas under high pressure, but the boldness of the method adopted in dealing with such a main, makes the "job" remarkable. Mr. G. F. L. Foulger, the Distributing Engineer of the Gaslight and Coke Company, in his time has had some peculiar engineering feats to perform in connection with the mammoth trunk mains which traverse Subterranean London, owing to underground railways and other works; but not one, we may hazard the opinion, has required greater care and expedition in performance than this one.

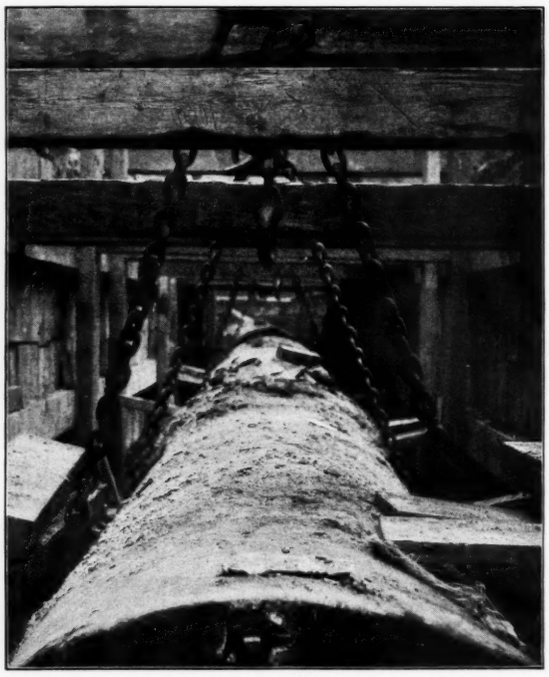
It should be explained that this particular piece of large trunk main lowering was the outcome of a decision by the London County Council to electrify the portion of the tramway system acquired by them lying between the Angel Public House at Islington and Southampton Row, Bloomsbury, and not by the trolley-wire system but by underground culverts. This necessitated the piloting of the whole length of road, to ascertain what there was in the way, in order to get the necessary depth for the culverts. It was not altogether a pleasant thing to find that the greatest obstruction was nothing less than a 48-inch high-pressure gas main, and that this would have to be lowered for at least an average depth of 2 ft. 6 in. over a very considerable distance. A 48-inch main charged with gas at high-pressure is not an insignificant thing to have to handle in this way. The main is used to pump gas from the Beckton works to the Westminster, Nine Elms, and Fulham stations—the pressure varying at Beckton from 48 inches downwards; being, of course, influenced largely at any given time by the number of stations which may be taking gas. The main is composed of 12-feet lengths, each length weighing 3½ tons. It was a ticklish problem that faced Mr. Foulger when he entered upon the consideration of how best to deal under the circumstances with a main of the length, calibre, and weight of this one, and containing gas under pressure. This was one phase of the question; the other was one of time. It was, on the one hand, imperative at this season of the year that the main should not be put out of use more than three days; and if the sinking could not have been accomplished in that time, then it would have been necessary to delay the public work in connection with the tramways by waiting until the spring of next year, when the main could be spared for a longer period. Within three days it was impossible to cut the main out and relay it in the ordinary way; and therefore Mr. Foulger evidently determined that it was a case where the combination of courage and care ought to see the work safely through in the three days—that is to say, the actual lowering without the preparatory work. We venture to think, after seeing a length of some 130 yards of the gigantic main in its lowered position, and knowing what it contained, that with most engineers there would have had to be a tremendous screwing up of nerves before adopting the almost "heroic treatment"—a better expression for the moment failing—that Mr. Foulger finally decided upon.

In the first place, a trench 9 feet wide and about 10 feet deep was opened; and as the soil was found to be of a loose and very treacherous character, concrete piers and benches were built from the bottom to carry the main in its new position. Heavy baulks of timber were clamped together in pairs, and fitted with powerful screws and chains behind each socket of the long length of main, which by these means was gently lowered into its new position—the joints cracking up and the main accommodating itself. It was, of course, necessary to cut out the centre length so as to have two ends free for lowering; the two sections being capped back. By gradually easing the screws, the main went down very comfortably indeed, and each joint accommodated itself perfectly; leaving an even thickness for the resetting—in fact, the joints were as even as they were before the main was disturbed from its original position. Within three days, the ponderous length was successfully lowered; the removed length was replaced, and connected up with a double collar—the opening and timbering having, of course, been previously done.

Before starting the work, care was taken to have plenty of gas stored at the uptown stations, to prevent difficulty through the exhaustion of the gas in the event of the lowering not having gone through quite in the manner expected and arranged for. But nothing happened that was not expected; and nothing happened but what was welcomed. The joints cracked evenly when the main was lowered, and then it was known that the main had settled down, and was not merely hung up. In a heavy piece of unusual work such as this—a 48-inch main, charged with high-pressure gas be it remembered—one could imagine many untoward things happening; but they did not. The success is the reward of courage and care; and Mr. Foulger is to be congratulated upon it.



A PERSPECTIVE VIEW OF THE WORK, TAKEN FROM THE TOP OF THE TRENCH.



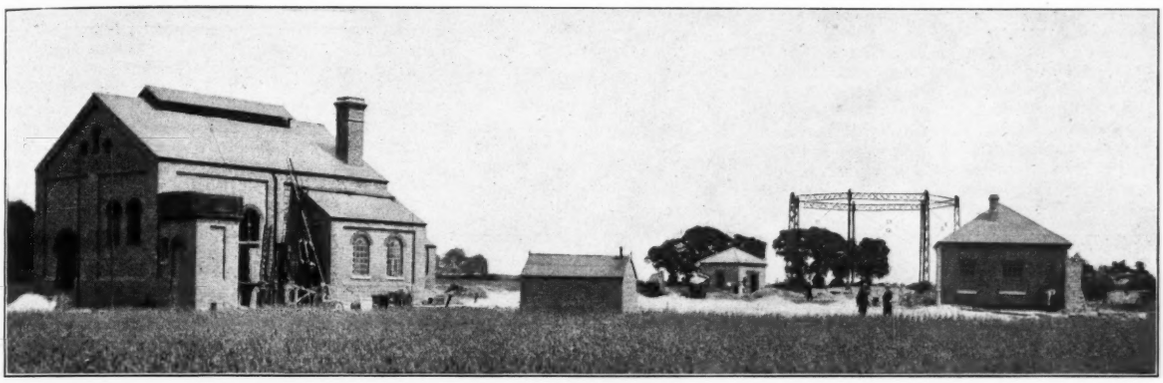
A PERSPECTIVE VIEW TAKEN INSIDE THE TRENCH FROM THE TOP OF THE 48-INCH MAIN.

In the carrying out of these operations, valuable help was rendered by Mr. Foulger's chief assistants, Mr. H. S. Reeson and Mr. J. F. Yeulett, and the staff generally. The labour was supplied by Messrs. John Aird and Sons, whose representative on the work (Mr. William Press) entered warmly into its successful consummation. Such a piece of work is of technical interest, and worthy of record—more especially as it is not an every-day occurrence for an engineer to have to lower a gas-main of this size, and to show that it can be so happily accomplished by the means Mr. Foulger adopted.

Modern Street Lighting.—In the paragraph on this subject last week, the cost of an ordinary incandescent burner should have been given as 1·6d., and of an inverted burner as 1d., per 1000 candle-hours.

THE "FIRST GARDEN CITY" GAS-WORKS.

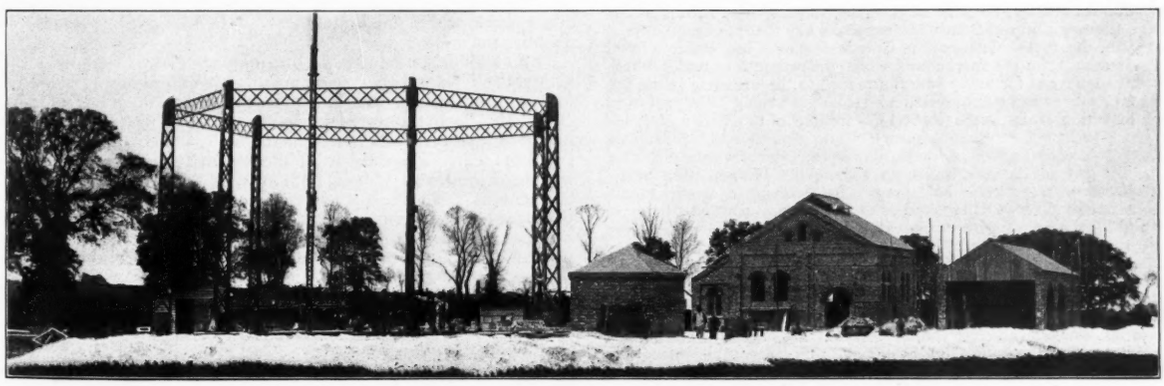
To most folk, the "First Garden City" partakes of something of the nature of an unreality—a project visionary only, and without form. But those who accepted the invitation of the Directors of the First Garden City, Limited, last Tuesday to visit Letchworth (which is another name for the Garden City in Hertfordshire) to participate in the opening of the gas-works which have been erected, in accordance with a scheme propounded by the Consulting Gas Engineer to the Company (Mr. Charles Hunt), found that the First Garden City is a living entity—rapidly developing for residential purposes, and already boasting a large motor works and printing establishment, and with other manufacturing firms considering the question of establishing their enterprises there to secure the advantages offered. The city was only started about sixteen months since, and gas and water works are now in existence; about 5 miles of sewers and roads have been constructed; and there are 250 houses erected, or in course of erection, besides several acres of land let out in small holdings for building, and sites taken up for factories. The area of the estate under the unfettered control of the Company comprises in all 6 square miles. The houses, it is learned, are built to suit the convenience of all—the rentals ranging from 5s. a week up to as high as £90 a year; the majority being about £30 to £40. The district is naturally



General View of the First Garden City Gas-Works taken during Construction.

pretty; and the designs of the houses are in keeping with the rural surroundings. We mention these things to show that the development from the very beginning of a private town is something more than a possibility—it is to-day an actuality, and that in this one the outlook for the gas-works, the opening of which it is a pleasure to chronicle, is good.

Among the visitors on Tuesday were Mr. Lesley Charles Probyn, the Deputy-Chairman of the Great Northern Railway Company, and his colleague Sir Henry Oakley, with several of the prominent officials of the Company. It was on all sides a gratification to find that Mr. Charles Hunt had so far recovered from his recent illness that he was able to be present. The company were met at the railway station by Colonel Bowring, C.B., R.E., the Chairman of the Engineering Committee of the Board of the First Garden City, Limited, and several of his co-Directors, together with the Secretary (Mr. Thomas Adams) and others of the Company's officials, including Mr. A. W. E. Bullmore, the Resident Engineer. The gas-works were, of course, the first destination of the party; but *en route* note was made of the building and developing work that is going on, and particularly of the manufacturing enterprise that has already settled in Garden City. The Heatly-Gresham Engineering Company's motor works were inspected, and Messrs. Parkinson and W. B. Cowan's depôt was pointed out. The latter firm are the contractors for the supply of meters, cookers, fittings, &c., on the estate. But by "Journal" readers, all these matters—although chief in importance for the First Garden City Company—will be regarded as very satisfactory from the point of view that they are contributory to the

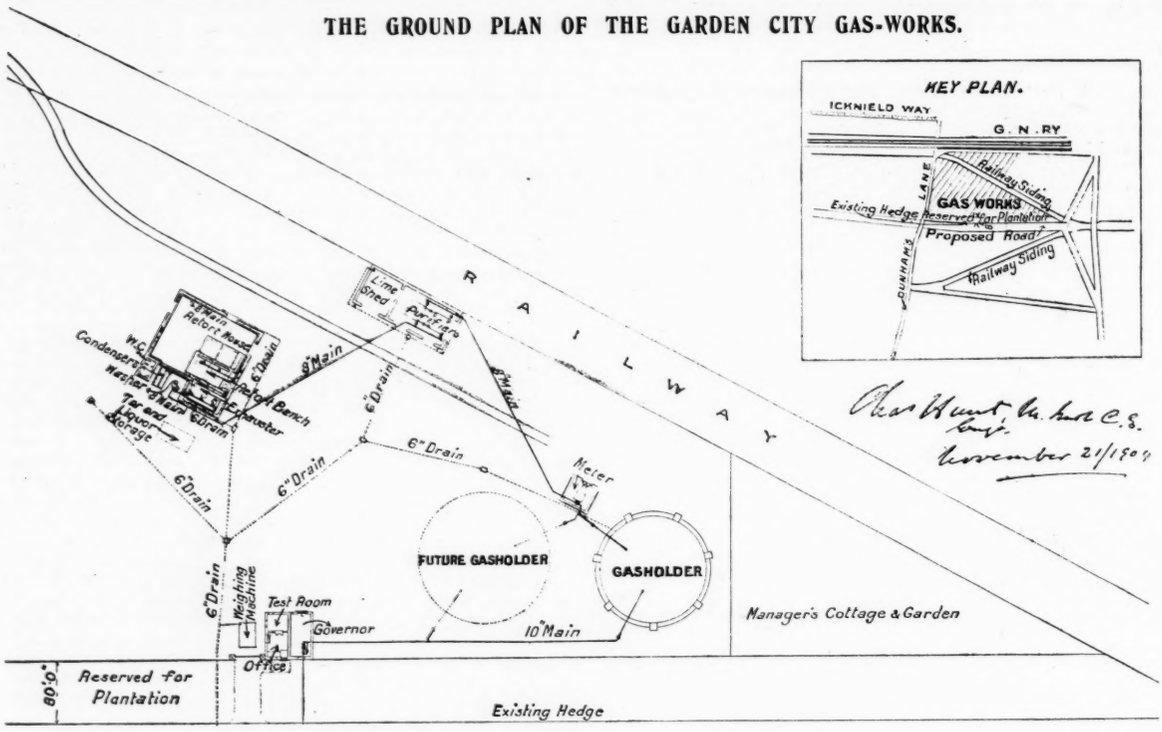


Another General View of the First Garden City Gas-Works taken during Construction.

success of the undertaking in which it is our duty in these columns to have the main concern. The erection of the works, it may be at once stated, was commenced in November, 1904; and they are on quite a small scale, as will be seen when described more particularly later in this account. During the day, the writer found opportunity for having with the Consulting Gas Engineer a chat on the works and the policy which, under his advice, the Directors are proposing to pursue, and note was made of the points. With his permission, we incorporate their general tenor in this account, before following the course of the day's events.

The works, said Mr. Hunt, are on quite a modest scale, as was but prudent under the circumstances; but they are so planned as to be capable of gradual enlargement at but a moderate cost, and there is sufficient land set apart for gas purposes for much larger works whenever these are required. The plant is well up to date; the intention being to make gas as cheaply as possible, and of a quality suitable for all the purposes for which gas is required—whether for lighting, heating, cooking, or motive power. For the first of these objects—namely, cheap gas—he remarked that he should like to invoke the aid of the Board of the Great Northern Railway Company, in order that, so far as in them lies, the coal may be brought to the works at as cheap a rate as possible. With regard to the use of gas, it is fully recognized, particularly in view of the development of the incandescent burner, that calorific value has become of more importance than illuminating power; and therefore this will be maintained as far as is consistent with obtaining a good yield of gas. With this object only coal will for the present be used for its production, and, indeed, if his advice be followed, until the greater economy of one or other of the various processes of mixed gas now in vogue has been satisfactorily determined. It is not, however, intended that efforts should stop short at the production of a really cheap heating gas. The policy which has already been inaugurated by the Directors in regard to consumers, cannot, he said, fail to give every encouragement to consumption. The price which it has been decided to charge for gas compares favourably with that which

THE GROUND PLAN OF THE GARDEN CITY GAS-WORKS.



Chas Hunt, M. Inst C.E.
November 21/1904

is charged by many far larger undertakings; and although it is not expected that this will result in any profit for the first year or two, it is hoped and believed that more benefit from it will eventually accrue to the undertaking, and to the community, than if a more remunerative price had been fixed from the outset, for this might easily have been a prohibitive one. The aim is to bring the use of gas at once within the reach of every one—from the artisan to the large manufacturer; and by thus encouraging it, to take a long step towards making this a smokeless city, and keeping it so. With this object, free cookers and gas-fires are being provided. On this question of the use of gas for domestic purposes, Mr. Hunt said he should like a few words to go out to the residents in Garden City regarding what had so often been said in depreciation of the use of gas for domestic purposes. Notwithstanding these depreciatory statements, more gas is used at the present time for such purposes than ever before. This, of itself, he remarked, is a practical refutation of the deleterious effects which are ever present in the imaginations of some people; but, if further proof were needed that no one ought to be deterred from the free use of gas by hygienic considerations, it is supplied by the latest act of the Legislature in regard to gas. Thanks mainly, he pointed out, to the persistent efforts of Sir George Livesey and the South Metropolitan Company, of which he is Chairman, the three Metropolitan Companies were last session freed by Parliament from the onerous and vexatious restrictions under which they have laboured for many years in regard to the presence in the gas of sulphur other than sulphuretted hydrogen, it having been proved to the satisfaction of the Departmental Committee of the Board of Trade that no injurious consequences are likely to result to the consumers from such freedom. No one need, therefore, entertain any idea that the use of gas can be otherwise than beneficial. He was glad to say that considerable progress has already been made in securing consumers in the Garden City; and, should the city continue to grow at anything like the same rate as it has done during the last twelve months, he thought he might venture to say that it will not be very long before the means of manufacture at the works will have to be increased. That the city will so continue to grow, and thus justify the hopes and anticipations of its founders, must be, and he had no doubt is, the earnest wish of everyone. A further observation (which, though humorous, was conceived in the interests of the Company's gas department) contained the expression of Mr. Hunt's hope that, among the many virtues which the "City Fathers" have it in their hearts to foster and encourage, that of "Early to Bed" will not be too conspicuous. Perhaps, however, he added, such a wish is superfluous, since the gas which it is intended to supply will, with the aid of the incandescent mantle, by its great effulgence, have the effect of turning night into day.

Opening the Gas-Works.

Arriving at the gas-works, the guests stood outside the main entrance-gates. Addressing the company,

Colonel Bowring said the gas-works had been designed by their able Consulting Gas Engineer (Mr. Charles Hunt, M.Inst.C.E.); and the work had been carried out under the direction of their Resident Engineer, Mr. Bullmore. The Contractors for the buildings and mains were Messrs. Davies, Ball, and Co.; for the gasholders, purifiers, &c., Messrs. Westwood and Wrights; and for the retort-settings (Messrs. F. C. Sugden and Co.); while Messrs. Parkinson and W. & B. Cowan, Limited, were supplying the estate with gas-meters, stoves, &c. In order to encourage the use of gas by gas-cookers and gas-fires, they were supplied free to the occupiers of the houses. Some of those present might think it was not a great advance on the part of the Directors of the First Garden City to adopt gas; but they considered the subject very closely at the time, and came to the conclusion that gas was advancing as rapidly, and had a future almost, if not quite, as good as electricity. It was proposed to supply gas to factories at a low rate, to encourage them to employ gas. They wanted to have the gas used for manufacturing purposes, and so save smoke, which was not in keeping with Garden City. He then called upon Mr. Lesley C. Probyn, who, as already stated, is the Deputy-Chairman of the Great Northern Railway, to open the works.

Mr. Probyn said he had great pleasure in accepting the request of his friend Colonel Bowring. He might say the Great Northern Railway Company took much interest in the First Garden City, and hoped very sincerely it would go on and prosper. It was to the Railway Company's interest it should do so. He hoped that the gas-works they were opening that day would also be very successful, and that the gas would be used a great deal in the factories. This was not only a place for residential purposes, but they all hoped that factories would be erected in it, and that much work would be done there. He had great pleasure in opening the works.

The small entrance gate in the main gates was then unlocked by Mr. Probyn; and the party immediately entered and proceeded to the retort-house, where, under the direction of Mr. Charles Hunt, Mr. Probyn quite expertly charged a shovelful of coal into one of the retorts—his performance being heartily applauded by those present. The outside of the entrance to the retort-house was decorated with foliage, pennants, and a large star illumination device. Mr. Probyn's next duty was to turn on the gas to this star; and to ignite the gas with a torch. Matches for the purpose were found in a gold vesta box, which was handed to him by the Chairman of the First Garden City Company, as a memento of the occasion. This portion of the ceremony was performed with equal success.

Description of the Works.

We must stay here to give a brief description of the works. The site which has been set apart for gas-works purposes is some 2½ acres in extent; and upon it there are now works designed for an output of 6 million cubic feet per annum. But the buildings and some of the plant are in excess of this; and, at comparatively small expenditure, it will be an easy matter to double the capacity, and, in some directions, even to 20 million cubic feet per annum. The retort-house is a brick building, with slated roof, and a ventilator (as seen in the photograph) running down the ridge of the roof. The house is 42 feet long by 34 feet wide inside. As mentioned by Colonel Bowring, the Contractors for this and other building work were Messrs. Davies, Ball, and Co. It must be remembered that, just as in starting Garden City, so in starting their gas undertaking, the Directors have to feel their way; and the commencement has not been a too ambitious one, though extension of capacity is an easy matter. This is noted in the retort-house, where is found at present only one bench of two settings—one containing three retorts and the other five (9 ft. 6 in. long by 18 in. by 15 in.), so arranged that, as needed, both beds can be converted into sixes. The settings are guaranteed to produce 7000 cubic feet per mouthpiece, with good coal—the Consulting Engineer's aim being to obtain a high yield.

There is also room in the house for two more beds of similar size. For the present, the space for these two extra beds will be occupied for coal storage; it being intended, when the house is fully equipped with retorts, to construct a coal-store adjoining. The settings are heated on the regenerative principle, and were built by Messrs. F. C. Sugden and Co. The Directors of Garden City purpose that everything shall be quite up to date there for works of such dimensions; and, therefore, considerable sidings from the Great Northern Railway have been authorized, and will be constructed in the next few months. The main sidings are intended for the service of the factories, which will be located alongside the railway, as well as for the gas-works. The plan gives an indication of the work that will shortly be carried out. There is nothing special to mention about the mountings of the retort-settings. The gas is led round the house by the foul main, falling back to the hydraulic. We find an unusual feature here for, at any rate, small gas-works, in the adoption of retort-house governors, somewhat after the manner of Mr. Carpenter's application several years ago at the Vauxhall works.

Outside the retort-house, between the exhauster-house and a building containing the men's lavatories and carrying an overhead water-tank (which are erected against the side of the house, as seen in one of the general views of the works), are the condensers, which are simply pipes on end. The exhauster is a small one made by Messrs. R. & J. Dempster, Limited; and the washer (situated next the condensers) is one of the Charles Hunt type, constructed by Messrs. Samuel Cutler and Sons. The purifiers are in a building (as seen by the plan) a little distance away. At present there are two luteless purifiers, each 8 feet square, and 5 feet deep, with Clapham's fastenings and Westwood and Wrights' ordinary—not centre—valves. The purifiers are so arranged that they can be readily duplicated. The lime-shed adjoins, and is a brick building, with wooden and tiled roof. The use of lime, with Mr. Hunt as the Consulting Engineer, may be a matter for explanation. It is purely a question of local expediency. The works are well away from residential property; lime can be obtained easily, without heavy payment for railway carriage, as the whole district is on a substratum of chalk; and the small amount of spent lime will find a ready market for agricultural purposes. But there will be no difficulty in reverting to the use of oxide should this be found advantageous. In the meter-house is found a Parkinson and Cowan meter. This is considerably larger than is at present required; being equal to double the make as the works stand. The gasholder (which, as was all the ironwork, was supplied and erected by Messrs. Westwood and Wrights) is a single-lift one, prepared for telescoping. It is 50 feet in diameter, and has a capacity of about 26,000 cubic feet. This can readily be doubled without any extra expenditure on the tank. It should be mentioned that the tank is constructed of Portland cement concrete and rendered. The formation here is an ideal one for a tank. The excavation was completely in chalk; and the tank rests on chalk. Therefore, all that had to be done was to fill up with Portland cement and concrete. The governor, which is one of Parkinson and Cowan's, is situated in a block of buildings at the entrance to the works, which block comprises a testing-room, office, and the governor room. Within the gates is a platform weighing-machine.

Passing out into the district, the mains are all larger than are required. Of course, with a district so young and only partly developed, speculation comes largely into the consideration of future requirements. But prudence prompted a good margin, so that considerable road disturbances should be unnecessary for many a long year to come. The leading main from the works is a 6-inch one, and at present about four to five miles of mains have been laid, and several more are in contemplation. Nothing less than 4-inch mains are being put down, excepting in one or two cases where there is no possible chance of getting extra consumption. The idea is to duplicate the mains, wherever the demand needs it, for the convenience of putting in services.

The Prospects.

The prospects, as Mr. Hunt pointed out in conversation and at the inaugural luncheon (which will be referred to presently), are excellent. The gas was only turned into the district about two to three weeks since; and last Tuesday there were thirty consumers on the books, and confidence is that very soon now there will be a hundred, a good proportion of whom will be on the prepayment system. It will be understood that, now the gas is available, it is only a question of settling down to business, which time has not yet permitted. Negotiations are well in hand with the trading establishments to become consumers at special prices. Already there are the Heatly-Gresham Engineering Company, Limited, and the Garden City Press, Limited, carrying on their operations there, and sites have been taken by Messrs. Vickers and Field, asphalte manufacturers, and Messrs, Ewart and Son, Limited, the well-known gas-geyser manufacturers. Even at the present time there are four gas-engines in prospect. The First Garden City Limited, are in an enviable position (as already shown) in regard to freedom in gas supply; and with a good development of the gas business, the Directors will be able to supply at a rate as cheap as, and cheaper than, contemporary works on the same scale. The present price is 3s. 6d. per 1000 cubic feet, and discount for prompt payment will bring it down to 3s. 3d. net, with, it may be repeated, cookers, stoves, and meters free. The liberality of the Directors in encouraging business is a sign of the sound advice they have received.

A Visit to the Water-Works.

So many of the party being interested in engineering, after leaving the gas-works, they could not resist, in driving round the estate, a visit to the new water-works, which (with the sewerage works and roads) have been carried out by Mr. G. R. Strachan, with Mr. Bullmore, as in the case of the gas-works, as Resident Engineer. At the pumping-station, it was learned that the bore-hole is 220 feet deep; and that the lifting pumps are equal to raising 12,000 gallons an hour. A twenty-four hour test of the well gave 11,000 gallons per hour; and the water-level was only reduced 3 ft. 8 in., notwithstanding the fact that it is a 14-inch bore-hole, so that it may be assumed that an ample supply has been secured. The water is raised by pumps (supplied by the Glenfield and Kennedy Company) to a service reservoir, 260 feet above the borehole. The pumps, it is interesting to note, are driven by a 22½ indicated horse power Campbell gas-engine—the gas being produced by a suction-gas plant. The working cost is 1¾d. per 1000 gallons delivered into the reservoir; this being simply for labour and cost of coal, without capital charges and wear and tear. The reason that suction-gas plant was adopted was due to the fact that gas was not available from the gas-works when the pumping had to commence, and moreover there is not a supply in the neighbourhood of the pumping-station. Although the gas-works has not therefore at present the pumping-station as a customer, it is rather a good thing for Mr. Bullmore to gain experience of this plant in comparison with gas-engine working with the ordinary supply; and we hope that, through the "Journal" columns, he will on some future occasion give us an account of his further experiences. To proceed, the capacity of the service reservoir is 250,000 gallons, and land has been reserved for its extension. The reservoir was built by Messrs. Davies, Ball, and Co. To the present time about 9 miles of mains have been laid; and about 230 houses are supplied with water. Expert analysis declares the water to be absolutely free from organic matter. It is expected that the Garden City Company will also supply with water the picturesque village of Baldock, which has, we believe, a population of about 2000.

The Luncheon.

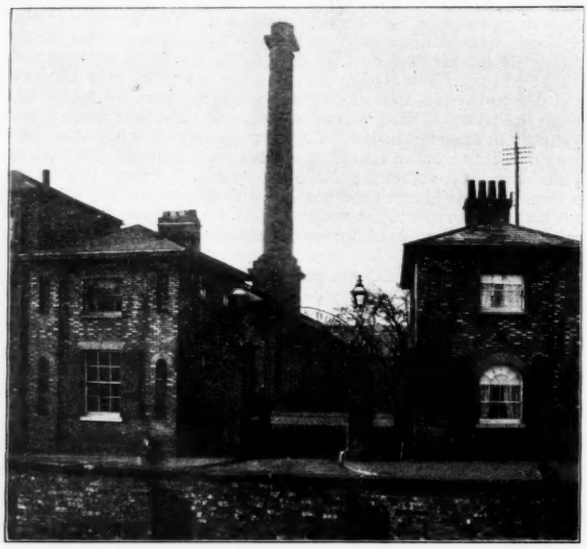
The drive over a large part of the estate ended at Letchworth Hall, where luncheon was served. In the absence of the Chairman (Mr. Ralph Neville, K.C.), Colonel Bowring presided. Following the luncheon, the Chairman gave the customary loyal toasts; and then he submitted the toast of "The Great Northern Railway Company." He welcomed the distinguished representatives of the Board (Mr. Probyn and Sir Henry Oakley), and the officials. As Chairman of the Engineering Committee, Colonel Bowring mentioned that, of course, railway matters came within his purview; and he was glad to say that they had a written promise from the Great Northern Company that they would assist as far as they could to foster the undertaking. Mr. Probyn, in his reply, remarked that the Directors would do all they possibly could for Garden City, as by so doing they would be studying the best interests of their own shareholders. What they looked and hoped for were important factories on the estate, and the Railway Company would do the carrying business that these factories required as well as possible, and as well as any of the railways of England could do it. He wished the First Garden City every possible success. The next toast was "The First Garden City;" and with it the name of Mr. Ebenezer Howard, the originator of the Garden City, was associated. Mr. Howard made an interesting reply; and concluded by referring to the special function in which they had been engaged that day—the inauguration of the gas-works. With his remarks, he associated the name of their Consulting Gas Engineer (Mr. Charles Hunt). Mr. Hunt was called for; and acknowledged the kind remarks that had been made by Mr. Ebenezer Howard. He added that he was very pleased indeed at the successful development of the gas-works scheme; and he felt certain that, in course of time, it would be a source of great convenience and profit to the First Garden City. He was sure the Chairman and Directors must be very gratified at the rapid development of their scheme; and all present must wish that development to continue. He could confidently say this, that if the First Garden City continued to grow as he had seen it grow during the last twelve months, the present capacity of the gas-works would soon have to be enlarged. In conclusion, he gave them "The Health of the Chairman." A short but neatly-worded response from the Chairman brought to a close the special proceedings connected with the event that had drawn the party together. Other parts of the estate undergoing development were then visited, and an inspection was made of the Cheap Cottages Exhibition, which has been such a source of attraction to Garden City. The afternoon was well spent when the company arrived at Letchworth Station, from which a rail motor car conveyed them to Hitchin to join a train from there to King's Cross. Everyone left with the warmest wishes for the success of the model gas-works at the inauguration of which they had assisted, and with the feeling that the hours passed in the First Garden City had been filled with interest.

In Denver (Col.) there is being tried a new system of street lighting, consisting of decorative iron arches spanning the principal streets, each arch supplied with about 200 eight-candle lamps on either side.

THE WORKS OF THE YORK UNITED GASLIGHT COMPANY.

The History of a Prosperous Concern.

THE visit of the members of the North of England Association of Gas Managers to York last Saturday week affords an opportunity for some reference to the gas undertaking of the city; and we are to-day enabled, through the courtesy of Mr. Matthew Leaf (the Company's Manager and the Association's President), to publish some photographs for the benefit of those who were not able to be present at the meeting, or, being present, could not find time to pay to the works one of those visits of inspection so dear to the heart of the gas engineer. As was stated by Mr. Leaf in his Inaugural Address, twenty-three years have elapsed since the Association last visited York; and at that time the Company were engaged in erecting new and independent works, on what were then considered the most up-to-date lines. These works, though they have been in existence for almost a quarter-of-a-century, are still termed the "new works," to distinguish them from the ones erected previously; and in the following notes it will be convenient to adhere to this designation.

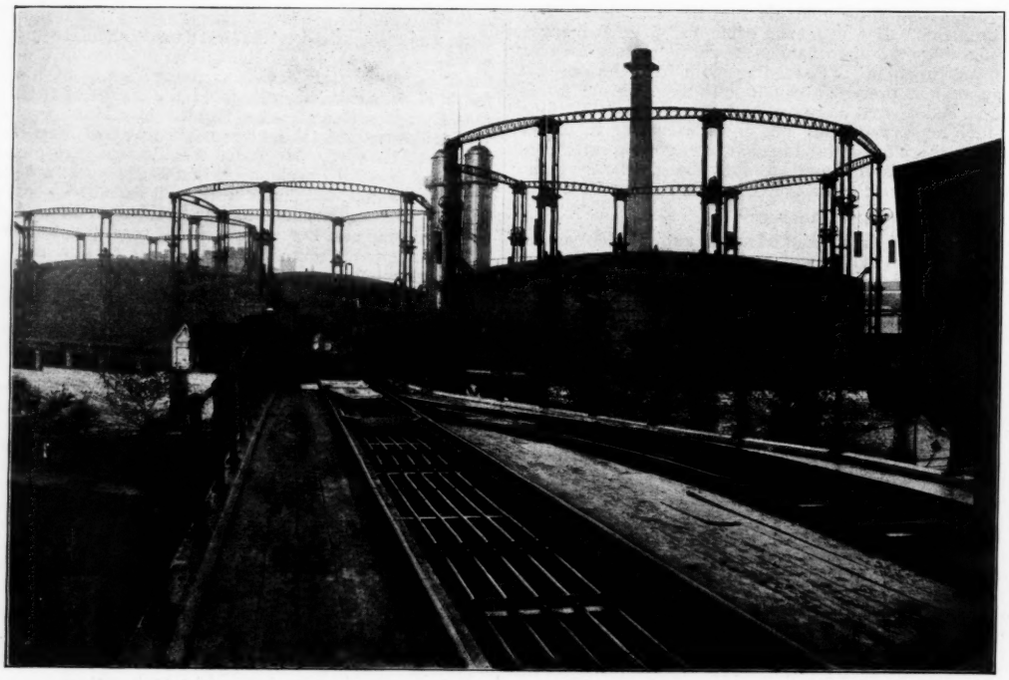


ENTRANCE TO THE OLD WORKS.

At York, as at other places, the first-established Gas Company—the York Gaslight Company, formed in 1823—did not have things all their own way; for a second Company, called the York Union Gaslight Company, came into existence in the year 1836. But this state of affairs did not last for very long, inasmuch as some eight years later—to be precise, in 1844—the two concerns joined forces, and formed the present Company. Since the amalgamation, the business has been carried on at Monk Bridge, on the site of the earliest-established Company; and these are what are termed the old works. Two of the photographs illustrate these works. The first is a view of the entrance, showing the retort-house, with the chimney-stack in the centre of the building. The house is 54 feet wide inside; and the central portion, with the chimney, was erected in 1847. Subsequently the building was extended in both directions, as the business increased; but the original design was kept to. The chimney is about 130 feet high; and, as regards its proportions, it is a copy of Trajan's column, at Rome. The other view is taken from the high-level railway, looking across the bridge, and shows the three gasholders in the background. These holders were erected in 1847, 1857, and 1867 respectively. The works cover an area of 3½ acres; and the carbonizing capacity is 1½ million cubic feet per 24 hours.

The new works occupy 5½ acres, on a site which was purchased from the Ecclesiastical Commissioners. This ground, in the time of the Normans, was the bed of a river, and was called the King's Fishery. The works were designed for the same output of gas as the old ones are capable of—namely, 1½ million cubic feet per 24 hours; but they have not been fully equipped in the matter of retorts, owing to the Company having a few years ago installed a 750,000 cubic feet carburetted water-gas plant. The first of the illustrations of the new works shows the retort-house (which is 210 feet by 110 feet), with the chimney stack. The building to the right of the picture is the generator-house of the carburetted water-gas plant. The last view is a photograph showing the high-level railway and railway bridge over the River Foss.

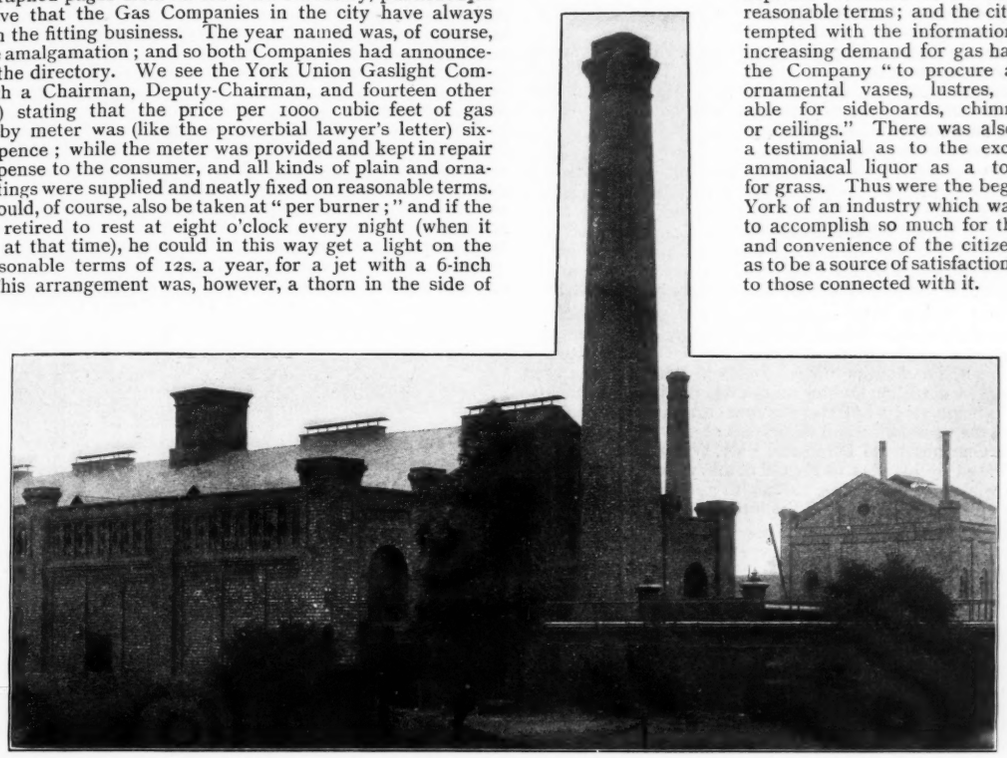
That the two works are more than able to meet the maximum demand that is at present made upon them, will be understood when it is mentioned that the total output per day in mid-winter is now about 2½ million cubic feet. There are 17,500 consumers—12,500 ordinary and 5000 prepayment. The following figures relating to the annual sale of gas are a record of continual steady progress. In 1850, the sale was 36 million cubic feet; in 1860, 66 millions; in 1870, 122 millions; in 1880, 224 millions; in 1890, 319 millions; in 1900, 462 millions; and last year, 497 millions. The last named figure is very satisfactory when it is remembered that up till 1903 the North-Eastern Railway Company were the largest consumers—taking about 32 million cubic feet a year; but that they have enlarged their works, and are now making nearly all the gas they require. The consumers have, of course, derived substantial benefit from the prosperity of the Company, the present charges for gas being no more than 2s. 2d., 2s., and



HIGH-LEVEL RAILWAY, LOOKING ACROSS TO THE OLD WORKS.

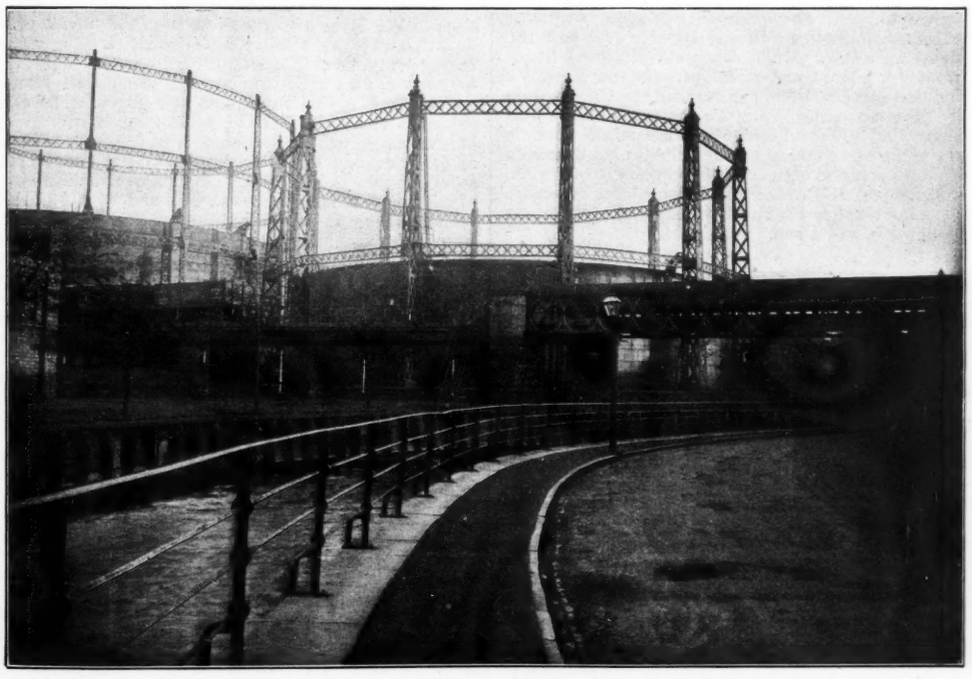
1s. 11d. per 1000 cubic feet, according to consumption, for ordinary purposes; while for supplies to gas-engines there is a discount of 10 per cent., which brings the net prices for power down to 1s. 11½d., 1s. 9½d., and 1s. 8¾d. per 1000 cubic feet.

Photographed pages from an old York Directory, published in 1843, prove that the Gas Companies in the city have always carried on the fitting business. The year named was, of course, before the amalgamation; and so both Companies had announcements in the directory. We see the York Union Gaslight Company (with a Chairman, Deputy-Chairman, and fourteen other Directors) stating that the price per 1000 cubic feet of gas supplied by meter was (like the proverbial lawyer's letter) six-and-eightpence; while the meter was provided and kept in repair free of expense to the consumer, and all kinds of plain and ornamental fittings were supplied and neatly fixed on reasonable terms. The gas could, of course, also be taken at "per burner;" and if the customer retired to rest at eight o'clock every night (when it was dark at that time), he could in this way get a light on the fairly reasonable terms of 12s. a year, for a jet with a 6-inch flame. This arrangement was, however, a thorn in the side of those who "burned the midnight gas;" for a similar light used from sunset up till 12 o'clock at night cost £1 8s. a year, while the charge for a batswing burner was £4. On Saturday nights all lights were allowed to burn until midnight; but to offset this, the consumers were expected to go to bed at dusk on Sundays, for all the quotations were subject to an increase of one-sixth if the gas were used on a Sunday. The notice, it may be mentioned, bears the name of "J. Braddock, Manager." The first Company in the field—the York Gaslight Company—were contented with a Board which consisted of a Chairman, Deputy-Chairman, and one other Director. The Managers (Messrs. Matthew Oats and Son) intimated that at the works every description of gas-fittings might be obtained, with superior workmen to fit them up on reasonable terms; and the citizens were tempted with the information that the increasing demand for gas had induced the Company "to procure a stock of ornamental vases, lustres, &c., suitable for sideboards, chimney-pieces, or ceilings." There was also included a testimonial as to the excellence of ammoniacal liquor as a top-dressing for grass. Thus were the beginnings in York of an industry which was destined to accomplish so much for the comfort and convenience of the citizens, as well as to be a source of satisfaction and profit to those connected with it.



Retort-House at the New Works, looking across the River from the Old Works.

Masonic.—In the presence of a number of Provincial Grand Officers for Bedfordshire, and some members of the "Evening Star" and "Northern Star" Lodges of Freemasons, Bro. C. F. Ruggles, the Secretary and Manager of the Leighton Buzzard Gas Company, was last Friday evening installed W.M. of the Beaudesert Lodge, No. 1087; the ceremony being most effectively rendered by W. Bro. W. D. Child, P.P.G.St.B. for Essex. Later in the evening, the members and visitors were entertained at a banquet at the Swan Hotel, Leighton Buzzard.



Railway Bridge over the Foss Navigation and the Public Road.

PERSONAL.

The "Staffordshire Sentinel" understands that, at a meeting of the Burslem Corporation Gas Committee last Friday, Mr. HENRY PEATY, who has for many years been Manager of the gas-works, tendered his resignation.

Mr. T. BEAVER has been appointed Manager of the gas-works which are being erected for the Withnell Urban District Council, to the plans and under the supervision of Mr. Isaac Carr, their Consulting Engineer. Mr. Beaver at present holds the position of Nuisance Inspector to the Council.

As will be seen from a report appearing elsewhere in to-day's issue, the Stourbridge Urban District Council have accepted, with regret, the resignation by Mr. WILLIAM NORTH of his position as Engineer and Manager of the Gas Department. To the many kind things said by the Chairman of the Gas Committee, all who know Mr. North and his work will subscribe; and there will be unanimous agreement with us in wishing that there may be a long period of rest and happiness before him on his retirement from active work six months hence.

Mr. JAMES C. WATSON leaves England to-day—to resume his work in Calcutta as Engineer of the Oriental Gas Company—after spending some months in this country. His stay has been largely occupied in rest, in looking up old friends, professional and otherwise, in inspecting what there is new in this country in connection with the production and utilization of gas, and in consultation with his Chairman and Directors. Mr. Watson returns home greatly benefited by his visit to the old country, and accompanied by the best wishes of friends for his health and welfare generally, and for the greatest prosperity of the interests he serves.

We record with great pleasure the recognition, by the members of the Town Trust of Sheffield, of the services rendered to the Trust by Sir FREDERICK MAPPIN, Bart., M.P., the Chairman of the Sheffield United Gas Company, by the presentation to him of his portrait. The Trust is an ancient Sheffield body having the control of funds arising from much property in the city, and they are applied in furtherance of charitable objects and assisting public improvements. Sir Frederick was elected a member in 1871; and in 1893 he became head of the Trust, succeeding the late Sir John Brown as Town Collector. The presentation was made last Thursday by the Duke of Norfolk, one of the Trustees, and it follows closely upon the celebration of Sir Frederick's diamond wedding. The portrait, which was painted by Mr. Ernest Moore, will be hung in the Town Trustees' room at the Court House.

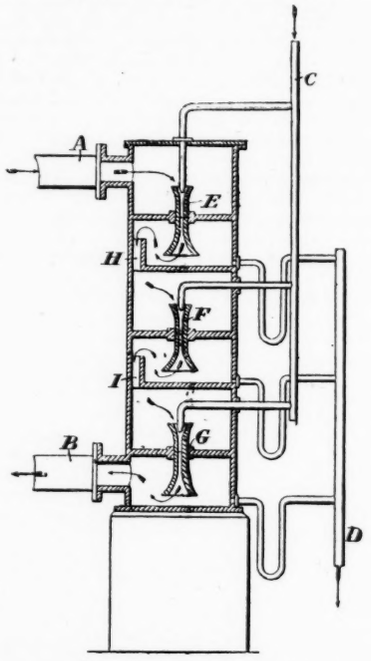
OBITUARY.

The British Association of Water-Works Engineers have lost an active member, and the Ipswich Water-Works an able Manager, by the death of Mr. HAMLET ROBERTS, Assoc.M.Inst.C.E., who succumbed on Thursday evening to an attack of pleuro-pneumonia. Deceased, who was in his 53rd year, took up his appointment at Ipswich in 1892, just after the undertaking had been purchased from the Water Company for £200,000. Almost directly afterwards, new pumping plant was put down; and some years later it was found necessary to duplicate this, in order to cope with the increasing demand for water. Mr. Roberts also designed handsome engine and boiler houses, and a service reservoir having a capacity of 4½ million gallons. The members of the Corporation—and especially those upon the Water Committee—realize that in Mr. Roberts they had a faithful and skilful official, to whom is due the efficiency of the undertaking, which will meet the demands of the town for many years to come. Prior to going to Ipswich, Mr. Roberts was engaged at Dover; and in his earlier career he had considerable experience in the North of England. He leaves a widow, four daughters, and a son.

PURIFYING GAS WITH AMMONIACAL LIQUOR.

M. Ott's Process.

In the last number of the "JOURNAL" brief reference was made to the process of purifying gas with ammoniacal liquor, for which patents have been taken out by M. Emil Ott; but the English specification has not yet been issued. The apparatus is, however, described and illustrated from the French specification in the current issue of "Le Gaz," from which we take the following additional particulars. The liquor enters the apparatus at C, and leaves it at D. It is introduced under high pressure (produced by falling or directly by means of pumps) by the pipes E, F, G; so that the gas, entering at A and passing out at B, is brought into intimate contact with it. In order that the liquor may remain as short a time as possible in contact with the gas, so as to avoid the liberation of the components which have been already absorbed, the gas which has passed through the central pipe flows onward through lateral openings, shown at H and I, in the direction indicated by the arrows. In case of need, two or three pipes may be arranged side by side, at the same height and on the same level. The height of the vessel may also be varied as may be required; and the entire apparatus may be arranged so as to occupy a horizontal position. In the vertical



washer, the gas could be made to finally pass through a column of liquor of a certain height, in order to be purified as completely as possible. Several washers may be placed side by side, and liquor made to circulate through them in a cycle; thus ensuring naturally an appropriate utilization of that which has already been employed.

New Issues of Directories.

We have received from Messrs. Hazell, Watson, and Viney, Limited, the "Gas-Works Directory and Statistics" for 1905. The present is the twenty-eighth issue of this well-known work, and the contents, which have been extended, have been revised up to July last. The statistical portion of the book is preceded by a list of Chairmen, Managers, Engineers, and Secretaries, as well as by lists of the several Associations of Gas Engineers, with the names of the President and Secretary, date of formation and meeting, &c. In towns where electric light works are in operation, the name of the authority or company supplying it is given. We have also received, from the offices of the "Journal de l'Eclairage au Gaz et à l'Electricité," the "Répertoire des Industries Gaz et Electricité" for 1905-6. The work appeared, we believe, for the first time in its present form about a year ago, and its contents then occupied 380 pages. The edition just received is considerably more bulky; the matter filling 600 pages. It is arranged in four sections. The first consists of useful tables and memoranda, to which several additions have been made; the second contains lists of the officials of technical societies, directors of companies, engineers, &c., and of the municipal undertakings having the control of the public lighting in Paris and the principal towns in France; the third gives lists of gas companies, and of the principal manufacturers of gas plant; and the fourth furnishes similar information in regard to electricity. Special mention should be made of the classification, by departments, and in one list, of the gas-works, central stations, and towns supplied by gas and electricity. This list shows at a glance the progress made with the two systems of lighting. The "Répertoire" is a vast improvement upon its predecessor; and the labour and correspondence involved in its production must have been very great. The Editor (M. Maurice Germain) has produced a volume which cannot fail to be useful to all who are seeking information in regard to gas and electricity supply undertakings in France. It is published at the Librairie Jeanmaire, No. 32, Rue des Bons-Enfants, Paris.

Gas Companies' Protection Association.—We learn from the Secretary of the Association (Mr. F. E. Cooper) that the eighth annual general meeting will be held at the Westminster Palace Hotel on the 27th inst. The business will consist of the reception of the report and accounts and the election of six members to serve upon the Committee in place of those retiring, all of whom, with the exception of Mr. W. R. Cooper, of Banbury, are willing to retain their positions.

THE ANALYSIS OF RAW AND SPENT LIME.

By H. Leicester Greville, F.I.C., F.C.S., &c.

There are two classes of commercial limes in the market. The one is the so-called hydraulic lime used for building purposes; the other the so-called flare lime used for purposes of gas purification. Much depends on the question of the composition of the limestone or chalk which is made into lime; but, for purposes of gas purification, flare lime is absolutely necessary. This is produced from the purest available chalk, and the term "flare" is derived from the method of converting the chalk into lime. The flare from a furnace decomposes the chalk, expelling the carbon dioxide, and leaving a comparatively pure product. An alternative method is mixing the fuel (generally coke) with the chalk in calcining. In this case, all the ash in the coke remains in the lime produced; and chemical reactions occur which vitiate the product—mainly the combination of the siliceous portion of the coke ash with the lime to form calcium silicates. Good flare lime should give not less than 90 per cent. of free lime. It should slake to a light porous mass; and, when properly prepared for use in the purifiers, it should be in a form which may be lightly compressed in the hand, breaking into a fine moist powder.

For the ordinary analysis of commercial limes, only two determinations are necessary—viz., for total lime and for carbon dioxide. The proportion of the latter is calculated into its equivalent of calcium oxide (CaO); and this being deducted from the total calcium oxide, gives the proportion in the free state, and therefore available for purposes of gas purification. There are many possible methods. A somewhat old-fashioned one is to determine the carbon dioxide by one of the ordinary appliances supplied by dealers in chemical apparatus. There are many forms, but they all depend on one fact—viz., that by decomposing a carbonate by an acid in any apparatus fitted with some drying reagent—such as sulphuric acid or a calcium chloride tube—the loss is taken as carbon dioxide.

With regard to the estimation of the total lime, the usual quantitative method is to dissolve a weighed quantity of the average sample in hydrochloric acid, add methylated spirit in the proportion of about two-thirds of the spirit to one-third of the solution, and then sulphuric acid in slight excess. Calcium sulphate is precipitated, which is collected on a filter-paper washed with diluted methylated spirit, and eventually dried, ignited, and weighed. The filter-paper, after the separation of the main precipitate, should be ignited separately, in order to avoid any possibility of the decomposition of calcium sulphate into calcium sulphide. The calculation is then simple—

1 grain $CaSO_4$ = 0·412 CaO
1 ,, CO_2 = 1·272 CaO
1 ,, CO_2 = 2·272 of $CaCO_3$

Supposing that 100 grains of the lime sample had been weighed out and dissolved, of which one-fifth was taken for precipitation and 45 grains of calcium sulphate obtained. This is equivalent to 18·54 grains of calcium oxide, which comes to 92·7 per cent. Supposing that 100 grains of the sample had given 1 grain of carbon dioxide, this would equal 1·27 per cent. of calcium oxide; and 92·7 − 1·27 = 91·43 per cent. for free calcium oxide, with 2·27 per cent. of carbonate. I may state here that the use of methylated spirit during precipitation and washing of the calcium sulphate is necessary from the fact that $CaSO_4$ is partially soluble in water, but not in moderately strong alcohol.

There are alternative and more expeditious methods for the determination of the proportion of free lime in commercial samples. I tried one process which promised success; but I had pressure of other work at the time, and therefore had to abandon the investigation. The method was founded on the fact that free lime, though having a limited solubility in water, is very much more soluble in strong solutions of pure cane sugar or glycerine. My experiments were made on sugar solution. There were placed in a 20-oz. flask 100 grains of the finely-ground sample, and distilled water added to effect slaking. The sugar solution was then added, and the mass digested for about half-an-hour at a gentle heat, the solution (diluted) made up to the measured volume, and a portion titrated with standard sulphuric acid with any suitable indicator. The following results were obtained:—

	Free Lime.	
	By $CaSO_4$.	By Sugar Method.
Sample No. 1	78·0	78·0
,, 2	93·8	93·9
,, 3	89·8	90·3

The advantage of this method is that it is volumetric, and only takes the free lime into account, rendering a special determination of the proportion of carbonate unnecessary.

Another rapid process (a well-known one) for the volumetric determination of lime is founded on the reaction on lime with ammonium oxalate, and on the reaction of an acid solution of the latter with potassium permanganate. For ascertaining the free lime, however, a determination of the proportion of carbonate, as measured by the quantity of carbon dioxide present, has to be made separately. Briefly described, and avoiding details, a standard solution of ammonium oxalate and one of potassium permanganates are prepared. On acidifying a measured quantity of the oxalate with sulphuric acid, and running in the standard permanganate, the pink colour of the latter rapidly vanishes, but the pink tint of the permanganate is so marked that the least excess is noticeable; and, unlike any other reaction with which I am acquainted in chemistry, no external reagent is necessary in order to know when finality is reached. The reaction is the oxidation of the oxalic acid in the ammonium oxalate by the available oxygen in the potassium permanganate, with evolution of carbon dioxide.

In practice, 100 grains of a mean sample of lime are dissolved in a minimum quantity of dilute hydrochloric acid, excess of ammonia is added, made up to a given bulk, and a portion of the filtrate is then treated with an excess of ammonia. A measured solution of the standard solution of ammonium oxalate is added, and the whole gently boiled. One-half of the filtrate may then be made strongly acid with sulphuric acid, heated, and the standard potassium permanganate run in, with constant stirring, until a faint, but fairly pink, colour appears. Assuming that the measure of ammonium oxalate used (in the absence of lime) would have required a defined quantity of the standard permanganate, a certain amount of the combined oxalic acid has disappeared by combination with the lime; and on this basis a calculation may be made, knowing how much of the standard oxalate is equivalent to its molecular equivalent of lime. This process gave good results.

	By $CaSO_4$.	By Permanganate.
Sample No. 1	89·5	89·0
,, 2	91·8	91·6
,, 3, as pure $CaCO_3$ (Found)	55·7	
,, 3, as pure $CaCO_3$ (Theory)	56·0	

A method of obtaining approximate results has been tried—viz., by slaking a weighed quantity of lime, subsequently drying it, and calculating on the proportion of water absorbed, as shown by the increase in weight, the quantity of lime present. Simple as this method appears to be, practically and theoretically, I have not found it to afford satisfactory results.

The question of the analysis of spent limes—or, putting the matter more accurately, I should say limes *supposed* to be spent—is a difficult one. I do not know of any analyst who professes to be able to give an accurate analysis of so-called spent lime, except by an elaborate investigation. The analysis of used lime is, as a rule, not so much directed to its actual composition as to the proportion of the free lime which it contains, and therefore to the proportion of the original active material which has been, from some cause or other, wasted in practical use. Some years back I devised a method, but I can only claim it to be more than approximative, as spent or used lime is a complex mixture. It should be mainly calcium carbonate—a practical reversion to the original chalk from which it was produced. As a matter of fact, everything depends on how the originally fairly pure material has been used or abused. There is no doubt that the least malodorous material is produced when lime is used *after* oxide—that is to say, when the gas has been previously purified from sulphuretted hydrogen. Claims have, however, been made that lime exposed to the combined action of carbon dioxide and sulphuretted hydrogen is more efficiently utilized under suitable conditions—viz., in cases where efficient tests are made to ensure that the lime purifiers have been passing a proportion of carbon dioxide equal to that of the crude gas for about five or six days. This condition is not always possible; and I have unfortunately no record of the value of the respective methods in utilizing the major proportion of the raw material.

The method which I devised some years back is founded on the following facts: (1) Spent or used lime is presumably principally calcium carbonate. (2) There may be more or less free lime present. (3) There are usually present some sulphur compounds. It is difficult to obtain a fair sample of used lime from a purifier. It cannot be taken from the vessel itself, but only from the mean heap of the material after discharge. The shortest exposure to air causes an oxidation of some proportion of the sulphur, with a corresponding change in its composition. Apart from free lime, sulphur compounds may be present, which are probably as follows: (1) Calcium sulphate ($CaSO_4$), (2) calcium sulphite ($CaSO_3$), (3) calcium sulphocyanide ($Ca[CNS]_2$), (4) calcium thiosulphate (CaS_2O_3), (5) calcium sulphide (CaS), and (6) calcium sulphydrate ($CaSH_2S$). The proportion of calcium oxide to sulphur is as 56 : 32, or of calcium hydrate as 74 : 32. Taking the hydrate as a basis (and this is the condition under which the lime exists in the purifiers), we get at the following ratios between the calcium hydrate and the sulphur in used lime: (1) 74 to 32, (2) 74 to 32, (3) 74 to 64, (4) 74 to 64, (5) 74 to 32, and (6) 74 to 64. In my procees it was assumed that 48 parts of sulphur corresponded to 74 of calcium hydrate. Differentiation is difficult; but this seemed to give an approximation of the truth.

The actual method pursued was as follows: 100 grains of the sample were placed in a flask provided with a funnel tube, fitted with a glass stopcock. The lime was decomposed by the gradual addition of hydrochloric acid; the gases evolved being passed into a solution of ammonia kept cool by being immersed in cold water. After the flask containing the lime had been boiled, the apparatus was disconnected, and the ammonia solution was treated with an excess of barium chloride and boiled. The precipitated barium carbonate, collected on a filter-paper, washed, and weighed, gives by calculation the proportion of calcium carbonate present in the sample. A grain of barium carbonate is equal to 0·508 grain of calcium carbonate. The residue in the flask may be filtered; that left after washing being ignited, and weighed and recorded as insoluble silicious matter. A portion of the filtrate is used for the

determination of the total lime. A further 100 grains of the sample are placed in a flask, and pure potassium permanganate added, until, after continual shaking, a permanent pink colour is obtained. Pure hydrochloric acid is then added, and if the pink colour disappears, more permanganate should be put in. To the solution thus obtained, oxalic acid is added and gentle heat applied. A clear liquid should then be obtained containing the whole of the sulphur in the sample in all forms as sulphuric acid. The proportion of sulphur can then be ascertained by the usual process of precipitation with barium chloride, by which 233 grains of barium sulphate are equivalent to 32 grains of sulphur. There is now a basis of calculation. The determination of the proportion of calcium carbonate may be taken to be accurate. Also the determination of the total lime in all forms.

Now comes a question which must be founded more or less on assumption, and it is this: The possible constituents of spent lime have been shown, and the respective ratios of combined lime to sulphur. Part are in the ratio of 74 to 32, and part in that of 74 to 64. If we take the former figure, the sample may be reported as containing more free lime than is present; if the latter figure, less. Except in the case of very bad samples, this is not a serious question, as the calculation is not based on either the one figure or the other, but is probably a rough mean of the two.

The calculation for free lime is based on this: The total lime present, the proportion as carbonate, and the proportion of lime combined with sulphur (say) in the ratio of a mean between 74 to 32 and 64—viz., 48. If a calculation is then made on (1) the total lime present, (2) the proportion of carbonate, and (3) the proportion of lime combined with sulphur, the residual lime, after all forms of combination, will represent the lime in the free state.

THE PURIFICATION OF GAS FROM SULPHURETTED HYDROGEN.

By Thos. Holgate, M.Inst.C.E., F.C.S.

In the articles which appeared in Vol. LXXXVII. of the "Journal," on "Gas Purification by Ammoniacal Liquor," the writer dissected the costs, over a period of years, at the Halifax Gas-Works. It was shown to what extent the cost had been reduced by the use of purified ammoniacal liquor, and an estimate was made for each year as to how far this reduction was shared by the lime section and how far by the oxide of iron section. The estimate of apportionment to the two sections was based upon a labour charge of 5s. per ton of lime; leaving the balance of labour to the oxide section. Since that statement was made and published, there have become available the results of two more financial years—viz., March 31, 1904 and 1905. During the first of these years, lime was used for several of the summer months, and then abandoned; so that there are now figures for a complete year with oxide purification alone. In the accompanying table, giving details of the cost of purification, these, the two years named, are placed alongside the preceding six years—that is, from the time that the oxide section began to show an excess of receipts over expenditure. The last year's returns entirely confirm what was in previous years only a calculation—viz., that by the use of purified ammoniacal liquor, the gas may be freed from a large proportion of its carbonic acid and sulphuretted hydrogen, with the ultimate result of a profit on the operation. Such a result is not, of course, entirely unprecedented, for about twenty years ago, with spent oxide selling at good prices, a similar effect was in a few instances realized. But taking the results of present-day working, it is, so far as the writer knows, quite unique.

A reference to the last issue of "Field's Analysis" shows the average cost of purification per 1000 cubic feet of gas sold to be as follows: Metropolitan Gas Companies, 1·02d.; Suburban do., 0·67d.; Provincial do., 0·64d.; Provincial Corporations, 0·62d.; Dublin Gas Company, 0·19d. These averages include gas undertakings which supply gas of varying degrees of purity; and therefore the figures are not so useful as they would be if the degree of purification practised were declared. It may be presumed, with little risk of error, that the following costs, which are the lowest in their respective classes, represent purification by oxide of iron only, and probably in some cases by admission of air to the boxes:—

Bath Company	0·20d.	Bradford Corporation	0·12d.
Bromley ,,	0·25	Leicester ,,	0·22
Croydon ,,	0·39		
Dublin ,,	0·19		

The average of these low costs is 0·23d. per 1000 cubic feet of gas sold, against an income of 0·04d. at Halifax—a difference of 0·27d., which on the quantity sold (808,351,000 cubic feet) is equivalent to £909 8s.

Taking the costs per 1000 cubic feet of gas purified, the following is a summary of the last eight years, in six of which there has been a profit from the oxide section of the purification and in two years a small charge. The first of these, a very small charge (0·047d.), was coincident with the maximum production of carburetted water gas—viz., 13·63 per cent.—which may be contrasted with the years 1898-1900, when no water gas was made, and the year 1905, when only 0·64 per cent. was produced.

Year ended March 31.	Percentage of Carburetted Water Gas.	Per 1000 Cubic Feet of Gas Purified.	
		Net Income.	Net Expenditure.
1898	nil	0·030d.	..
1899	,,	0·005	..
1900	,,	0·025	..
1901	9·79	0·007d.	..
1902	13·63	..	0·047d.
1903	6·37	0·019	..
1904	1·83	..	0·150d.
1905	0·64	0·048d.	..

Table *giving Details of Cost of Purification at the Halifax Gas-Works.*

[The sign − means "credit."]

Year ending March 31.	1898.	1899.	1900.	1901.	1902.	1903.	1904.	1905.
Wages	£753	£611	£817	£780	£673	£809	£440	£456
Lime	828	850	789	1,051	1,130	1,044	342	19
Spent lime	− 21	− 21	77	178	148	236	99	20
Oxide of iron	− 302	− 275	− 472	− 360	67	− 402	370	− 462
Brimstone	− 212	− 13	− 156	− 85	− 151	− 79	− 93	− 168
Net cost of purification	£1,046	£1,152	£1,055	£1,565	£1,867	£1,608	£1,158	− £135
Gas purified, thousands	774,650	826,387	862,842	870,152	872,214	876,131	946,230	894,877
Carburetted water gas, per cent. (estimated)	..	..	..	9·79	13·63	6·37	1·83	0·64
Illuminating power in candles	18·45	18·37	17·62	17·75	18·47	18·05	?	?
Lime used tons	1,345	1,361	1,125¾	1,450	1,664	1,575	505	30
,, ,, per 1000 cubic feet of gas purified	3·88	3·68	2·92	3·73	4·27	4·02	See foot note (*a*)	
,, ,, price per ton	s. d. 12 3¾	s. d. 12 6	s. d. 14 0½	s. d. 14 6	s. d. 13 7	s. d. 13 3	s. d. 13 6½	s. d. 12 6
,, for spent lime removal	− 3¾	− 3¾	1 4½	2 5¾	1 9¾	3 0	3 10	13 7 (*b*)
Cost of lime used per ton, including removal	12 0	12 2¼	15 4¾	16 11½	15 4½	16 3	17 4½	26 1
Estimated wages on lime section at 5s. per ton of lime	£336	£340	£281	£362	£416	£394	£126	£8
Lime as above, *plus* estimated wages	1,164	1,190	1,070	1,413	1,546	1,438	468	27
,, ,, and do. per 1000 cubic feet purified	0·360	0·346	0·296	0·389	0·425	0·394	0·119	0·007
Estimated wages on oxide section, by difference	£417	£271	£536	£418	£257	£415	£314	£448
Oxide of iron and brimstone	− 514	− 288	− 628	− 445	− 84	− 481	+ 277	− 630
Wages and materials, oxide section	− 97	− 17	− 92	− 27	173	− 66	+ 591	− 182
,, ,, ,, per 1000 cubic feet purified	−0·030	−0·005	−0·025	−0·007	+0·047	−0·019	+ 0·15	−0·048
Net cost of purification, including expenditure on spent lime: per 1000 cubic feet purified	0·324	0·334	0·294	0·431	0·512	0·440	0·294	−0·036
,, ,, sold	0·353	0·363	0·318	0·466	0·554	0·476	0·331	Gain of −0·040

(*a*) Purified liquor in use in the northern section of the works during the whole of these eight years. Up to the middle of the financial year 1904, the carbonic acid not thus eliminated and part of the sulphocarbons were removed by means of lime. After that date, in the purifiers sulphuretted hydrogen only was removed. The percentage of carburetted water gas made each year affects the cost of purification from sulphuretted hydrogen, because the carbonic acid present therein neutralizes the ammonia in the liquor more readily than does sulphuretted hydrogen.

(*b*) What appears an abnormal figure is due to the fact that much more spent lime was being sent away than new lime used.

INVERTED GAS-BURNERS.

By Professor H. Drehschmidt, Chemist of the Municipal Gas Undertaking of Berlin.

The following is an abstract translation of a paper on "Inverted Incandescent Gas-Burners," by Professor H. Drehschmidt, which has recently been published in the "Journal für Gasbeleuchtung." The paper was originally read at the meeting of the German Association of Gas and Water Engineers, at Coblenz, last summer; and the conclusions at which Professor Drehschmidt arrived were given in the "Journal" report of the proceedings at the meeting.* Having regard to the importance of the subject, and the fact that explanatory diagrams are now available, the following fuller digest of the paper is presented.

Electric lighting seemed at one time to have an advantage over gas lighting in that the great intensity of the arc light reserved to it certain spheres of application. But the invention of the high-power incandescent gas-light of upwards of 2000 candles, showed that even there gas was a successful rival to electricity. Nevertheless, the arc light had the advantage that it emits the greater part of its light in a downward direction, whereas the incandescent gas-burner emits most of it upwards. According to the author's researches, the ratio of light emitted above to that emitted below the horizontal plane with the incandescent gas-burner is 1·2 to 1; while Professor Wedding has found the ratio to be 1·7 to 1. The difference is doubtless due to the mantles used by the author being more nearly cylindrical in shape. The gas engineer endeavoured, by the aid of reflectors, screens, and globes, to make the unfavourably distributed light available for

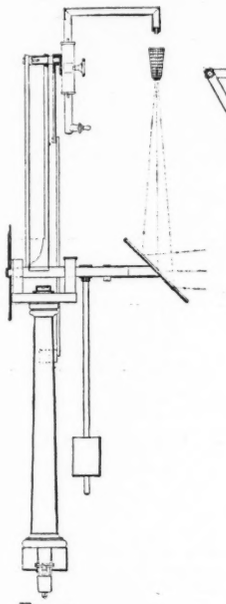


Fig. 1.

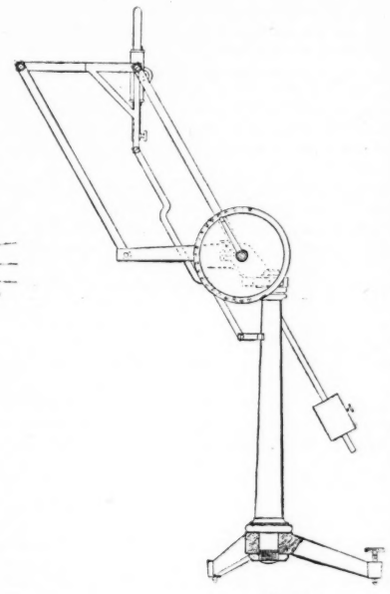


Fig. 2.

use; but he thereby frequently rendered the incandescent gas-light cumbrous and inelegant, so that decoratively it gave place to the electric light. The efficiency also of many of the reflecting devices was very low. For example, a reflector as used in the Berlin street-lamps diverted downwards only 6·5 per cent. of the upward light. Many globes—such as the holophane—are more efficient, but impress the public unfavourably. Endeavours have therefore constantly been made to overcome the fault of bad distribution of the light, by altering the shape of the burner. Thus at one time this fault, as displayed by flat-flame and argand burners, was disposed of by changing to the inverted or regenerative burners of Siemens and Wenham. These, however, had the fault of emitting very little light in a horizontal direction, and so were unsatisfactory for the general lighting of a room.

Recently a more satisfactory distribution of the light evolved has been secured through the medium of the inverted or pendant incandescent gas-burner. Its application in Germany has, however, the author believes, been rather restricted. Very varied and discrepant views are held as to the value and utility of this type of burner. One prominent technical man told the author a few days ago that he regarded it as a great fraud. The results of investigations made in the laboratory of the municipal gas-works at Berlin on a large number of these burners may serve to elucidate the matter; and the author therefore takes this opportunity of publishing the more important of them.

As a rule, only the illuminating power in the horizontal plane is determined in testings of incandescent gas-burners and mantles. For the object in view, however, the determination of the illuminating power at different angles was essential. The apparatus used for these determinations at Berlin is shown in the preceding drawings, figs. 1 and 2. A mirror set at an angle of 45° is fixed on a revolvable axle, which is firmly attached to a parallelogram built up of rods. To one angle of this parallelogram is fixed the arrangement which supports the burner. Thus, when the parallelogram is rotated, the burner retains its vertical position. The light which falls on the mirror at any angle of radiation—which angle is determined by the position of the parallelogram—is reflected horizontally. If the apparatus, therefore, is set up so that this light is reflected in the direction of the axis of a photometer-bar, its intensity can be measured as readily and quickly as a measurement of horizontal illuminating power can be made.

Naturally there is at first blush a certain mistrust of the inverted incandescent burner. The bunsen flame's natural direction is upwards; and it has to be induced to take a downward course. It might be thought that this could only be effected by means of complicated contrivances, especially as the old regenerative inverted burners were by no means simple. This idea is supported by a specimen, which the author has, of an early type of inverted incandescent gas-burner, in which there is a chimney tube over a yard long, and the shape is anything but convenient. It apparently never occurred to the inventor of this burner to try simply inverting the ordinary incandescent gas-burner and cementing a mantle to its mouth with water-glass. He appears to have thought that the combustion gases must pass through the mantle in order to give up their heat to it and raise it to incandescence. This last idea still pervades the construction of many inverted burners; but the latest types have the burner mouth of much smaller diameter than the mantle, so that there is a space between burner and mantle for the escape of the gases. If this space is closely filled up, so that the gases are forced to penetrate the mantle, a considerable diminution of illuminating power ensues, and the flame becomes smoky. It may be demonstrated, by passing a burning match close to the mantle of a lighted inverted burner of proper construction and behaviour, that there is but very little penetration of the mantle by the flame gases. The flame of the match is drawn up towards the mantle, and not repelled by it. Moreover, if a little solid iodine is placed on the lower part of the globe, it is volatilized; and by its action on the metal of the supporting ring colours the flame gases green. The colouring is, however, not observable outside the mantle, but only between it and the burner-tube. Again, if a smoking burner is watched, it will be seen that the soot deposits on the burner-tube—thus indicating that the combustion gases have passed between the burner-tube and the mantle-ring. The proper behaviour of an inverted burner appears, therefore, to entail the provision between the mantle and the mouth of the burner of a free space which is not too narrow for the ready passage through it of the gases produced by the combustion of the gas.

Reverting to the evolution of the inverted incandescent burner, a mantle closed below was soon adopted in place of the open-ended pattern in use on upturned burners; while its one open end was firmly secured by asbestos filaments to a ring of metal, magnesia, or other material. This ring had projections for hanging the mantle on the burner. The burner, however, was very liable to light-back. Bernt believed that this was due to the heating of the burner-tube, and that it could be avoided by using non-conducting or insulating material for the burner tube and mouth. But later experiences showed that the same object could be more surely and better attained by maintaining proper relations between the size of the burner-tube and opening and the diameter of the mantle. The heating of the burner-tube, and thereby of the mixture of gas and air, was, indeed, found to be beneficial, and to improve the illuminating power. In the best burner so far known to the author, the heat of the escaping products of combustion is actually further utilized for the purpose of warming the primary-air supply before it enters the burner-tube.

The first inverted burners put on the market were, however, not calculated to find much favour, even when they had not the fault of lighting-back. As a rule, they emitted an evil smell, and injured fittings by their escaping products of combustion. The latter were not prevented from mixing with the air which entered the burner; and the admixture conduced to incomplete combustion, and a bad smell. The next advance was therefore the introduction above the mantle of a deflecting plate or guide, of metal or other material, with the object of diverting the products well to the side. It was found that the deflecting plate had to be placed a certain distance from the mantle; and it was further discovered that the products could thus be taken away more or less on one side, instead of in all directions, and so prevented from striking the fittings. A pear-shaped glass globe is usually employed to surround and protect the mantle, and to give the draught of a chimney. The secondary-air supply to the burner enters through holes in the side or the bottom of the globe. But hemispherical globes, entirely closed below, are also used, in order to give the effect of small electric arc or Nernst lamps. There is then usually within the globe a short glass chimney surrounding the mantle, and the secondary air passes over the edge of the globe, down to the lower end of the chimney and up it. The draught is often increased by placing a chimney-tube above the mantle; but unless this is done with circumspection, it is apt to spoil the appearance of the burner.

Satisfactory behaviour of inverted burners can only be secured if the gas supply is carefully controlled; and as the quality of gas varies in different places, means of regulating the inflow of primary air must also be provided. A uniform gas pressure is advantageous. These points, however, are not peculiar to the

* See Vol. XCI., p. 101.

inverted burner, but apply more or less forcibly to the ordinary burners. The first inverted burners used rather short mantles; and but little illumination laterally resulted from them. The later longer mantles gave better lateral illumination, and much higher efficiency. The burners with the early mantles, indeed, gave the impression that the inverted light would only be suitable for lighting work-tables, desks, &c., and not for the general lighting of rooms; but quite recent burners with long mantles have proved generally applicable, and have overcome the author's early distrust of the inverted type.

It has only been possible here to touch lightly on the chief points which bear on the appreciation of the inverted incandescent gas-burner. It is not the author's intention to discuss in detail the success and construction of particular burners of this type, but rather to show what has so far been achieved, and to what extent the results warrant the gas industry putting its faith in the inverted burner as a class. With this object in view, a few patterns will be selected in order to demonstrate what advances have so far been generally accomplished.

(To be continued.)

UTILIZATION OF GAS-ENGINES IN LONG-DISTANCE ELECTRIC TRANSMISSION.

By J. MARTIN, of San Francisco.

[From a Paper read before the Pacific Coast Gas Association.]

The very rapid progress in the development of electrical machinery and appliances during the past ten years has invited the capitalist and the engineer to instal and operate many hundred thousand horse power, utilizing the waters of the various streams as a source for generating the current. The prime incentive for such development, from the inventor's standpoint, was the fact that the source of power was being constantly renewed by the laws of Nature, and with the authentic records of precipitation as a guide, the prudent engineer has recommended a great many plants to be constructed which have proved financially and commercially successful. The most notable examples of this progress have been, and are being, developed in the State of California. A great many surprises of a practical nature have been encountered by the managers of these various water-power electric developments, with special reference to earning capacity, and more particularly with regard to the relations of "plant utility to plant capacity," commonly termed "load-factor." The manager is constantly trying to find ways and means of utilizing the electric current during those times of the day or night when his present consumers do not require it. Numerous plans and devices have been utilized to further this end.

Within the past year, the problem was presented to the officers of the California Gas and Electric Corporation, who were desirous of furnishing all the electric current for the operation of the street railroads under the control of the United Railroads of San Francisco; and negotiations were commenced with the officers of the latter Company with this end in view. It was very difficult for the railroad people at first to develop even a hope that such a condition of affairs could be made feasible. Here was a concern with its thousands of horse power developed at no point nearer than 140 miles from the proposed place of consumption; and while it is true that the Company have many sources of supply and many avenues of delivery, there was an insurmountable barrier in the minds of the railroad people as to the advisability of purchasing current at any price, if the convenience of their patrons was to be sacrificed in any way.

After numerous interviews, with an honest desire on both sides to try to accomplish the economic result, if it could be done without sacrificing the interests of the patrons of the Railroad Company, a conclusion was reached that in a service so large and important as the carrying of hundreds of thousands of people daily in a large city, nothing could be done on the plans outlined unless some absolute guarantee of continuity of service were available; and it certainly was not favourable from the standpoint of the utilization of steam-engines for emergency purposes, because if steam were being maintained constantly under the boilers, no economy could result, and if the plants were allowed to cool off, the time element of starting would prohibit their use.

The officers of the Power Company had been making thorough investigations of the development of the gas-engine in large units; having sent two of their engineers throughout the entire East to make full and complete reports. In consequence, and as a last resort, the Company agreed to instal three gas-engine electricity generating units, each having a capacity of 4000 kilowatts, or a total initial capacity of 12,000 kilowatts. This plant will be enlarged as rapidly as the requirements of the railroad may demand.

The guarantees which have been made by the manufacturers of these engines are particularly interesting. They are: Electric transmission in a position to practically guarantee continuous service, regardless of the length of its transmission lines or the momentary interruptions which occur through causes beyond human control. It might be fairly stated that the gas-engine stands alone as the only means of instantaneous generation of electric current at distributing centres in times of emergency at any fair or reasonable cost.

The gas-engine electricity generating plant of the California Gas and Electric Corporation will also be utilized to a certain extent for the purpose of increasing the load-factor of the transmission line, for it is obvious to those familiar with power-transmission plants that, after proper installations have been made, including full capacity at the hydraulic end, as well as in the power-house and in pole-lines, there is absolutely no increased cost for current whether the load-factor be 0·2 or 0·99; and any device which can be utilized to improve the load-factor adds this much income and net profit for the power plant. In this particular case, the gas-engine generating plant was a necessity, for without it the Gas and Electric Corporation would have been unable to obtain the contract for power. This being the case, the officers decided to make a virtue of necessity, and up to the extent of the cost of the fuel being less than the increased value derived from improving the load-factor on the power lines, they propose to operate this gas-engine plant in that manner and for that purpose.

The gas which will be used to drive the engines will be manufactured from crude oil, and will be of quality similar to that of the illuminating gas now being distributed throughout the State of California manufactured by this process, ranging from 610 to 660 B.T.U. per cubic foot. Nearly all the gas-engines which are at present in use throughout the East and Europe are utilizing producer gas or blast-furnace gases, except in the case of very small units or where natural gas can be obtained; and from investigations which I have made, I have ascertained that the largest gas-engine using manufactured gas of more than 600 B.T.U. has a rated capacity of 300-horse power, while those in process of installation near San Francisco will in each case be more than seventeen times as large. The nearest approach to these engines in size are two in operation at Hastings (W.Va.), each of 4500-horse power capacity, and driven by natural gas, and being used for the compression of natural gas for transmission through a pipe-line 200 miles in length. They can be started from cold and rest to full load in less than 60 seconds.

The following is a description of the engines, which in general design and detail resemble very closely a modern high-grade massive American steam-power engine. They are of the horizontal twin tandem double-acting four-cycle type, giving two impulses to each crank per revolution. This is equivalent to a cross compound steam-engine. All the working parts are above the engine-room floor; nothing but the water supply, gas, air inlet, and exhaust pipes being below, and these are arranged so that they can be trenched. Lubrication of the cylinders is effected by spreading. This is accomplished by leading four oil-feeds, fed by individual oil-pumps, to each cylinder, and entering the cylinder at points to successfully effect the proper spreading of the oil. The pistons are carried by cross-heads, thereby materially reducing the weight on the bore of the cylinders. By the use of three cross-heads (the main, intermediate, and outboard), proper alignment of the pistons is permissible after years of service; and it is questionable whether an engine without this feature can be regarded as entirely satisfactory. The question of regulation in the generation of electric current by means of direct-connected electrical generators has been a problem not only for the gas-engine people but for the steam-engine manufacturers to solve; and this has been done in the latter case within the past two years practically to the satisfaction of the electrical engineer, so that parallel operation is now successful.

The main shaft will be of the overhung crank type, having the cranks forged with the shaft and with crank-pins forced into the cranks. The main connecting-rods are simple, plain, with solid adjustable stub ends. The pistons are designed in such a way that expansion of the faces can take place without affecting in any way the strength or life of the piston. The piston-rods extend from the main cross-heads, clear through the cylinders to the outboard cross-heads, and are secured to them by nuts. Each cylinder is made in two parts, the joint being circumferential, and located half way between the ends. Separate supply-pipes for each individual part to be water-jacketed will be furnished, so that the amount of water fed to each part can be regulated; thus permitting the carrying of high temperatures in such parts as cylinder heads, medium temperatures in cylinder jackets, and low temperatures to the rods, pistons, and metallic packing. The engines are started by the use of compressed air on storage in compression-tanks. Safety devices are provided which effectually control the speed limit.

The following are the dimensions of the engines: Length over all, 70 feet; width over all, 34 feet; weight of heaviest casting, 60 tons; diameters of cylinders, 42 inches; length of stroke, 60 inches; main journals, 30 inches in diameter, 54 inches long; main cross-head gibs, 27 inches wide, 54 inches long; diameter of centre of shaft, 38 inches; weight of fly-wheel, 130,000 lbs.; total weight of engine, fly-wheel, and generator, 1,200,000 lbs. (600 tons).

The engines will probably be in operation on or before Jan. 1, 1906; and from all the investigations which have been made by my co-workers, we are not labouring under any doubt as to the absolute success of the installation when completed.

His Majesty the King has been graciously pleased to accept a copy of Mr. C. E. Brackenbury's work on "British Progress in Gas-Works Plant and Machinery," which was noticed in the "JOURNAL" for the 5th ult.

A VISIT TO VAUXHALL GAS-WORKS.

A visit was paid on Saturday afternoon by the Association of Engineers-in-Charge to the Vauxhall works of the South Metropolitan Gas Company, and the gasholder station at Kennington Oval. The party—consisting of something like sixty members and one or two friends—were met at the works by the Engineer (Mr. A. F. Browne), who gave them a cordial welcome, and himself headed the tour of inspection—doing everything possible to aid the visitors to fully understand the various processes carried on. In this, he was ably assisted by Messrs. D. Chandler and C. J. D. Gair, members of the Engineer's Technical Staff; Mr. J. Pendlebury, Works' Foreman; Mr. R. M'Kinlay, Foreman of Mechanics; Mr. J. Strutt, Carbonizing Foreman; and Mr. A. J. Carter, Assistant Works' Foreman. Mr. C. B. West, Assistant to Mr. Browne, was unfortunately absent owing to illness.

Divided into small groups, the party first of all visited No. 4 retort-house, where they saw the charging and drawing being accomplished by means of the Arrol-Foulis hydraulic machinery, working at a pressure of 550 lbs. per square inch; then No. 3 house, in which the retorts are charged and drawn entirely by hand; and lastly, No. 2 house, where West's compressed-air stoking machinery (working at 60 lbs. pressure per square inch) is employed. The maximum daily make at the works is 13 million cubic feet; the total number of retorts being 866. The average make of gas per retort is 14,500 cubic feet; and per ton, 11,250 feet. In connection with the unloading of the coal from barges in the river, which is accomplished by means of hydraulic cranes, attention was drawn to a Hone grab, which carries 15 cwt. per lift, completing the operation from barge to coal-hopper and back in about 44 seconds. After looking into one of the coal-stores—the total storage of the works is 15,000 tons—a visit was paid to the producers, which are of the generator type, each producer supplying two beds, or twenty retorts. The depth of coke in each furnace is about 8 feet, and the grate area 28 square feet, or 0·7 square foot per mouthpiece. It was explained that the condensing plant is now undergoing reconstruction; the new form of condenser adopted being the hydraulic tower type, designed by Mr. Charles Carpenter, the Company's Chief Engineer, in which the gas passes down a number of 3-inch tubes, about 40 feet in length, which are surrounded by water flowing in an opposite direction. The exhausters (six in number, driven by Donkin's Farey condensing engines) were next visited; and then the Livesey washers, tower scrubbers, and "Standard" washer-scrubbers. An interesting feature was the purifiers, from which the lime is now being removed, to meet the Company's new conditions of purification; and the revivifying floors, a quantity of natural bog ore as it arrived from the mines, and some Weldon mud (which is used in two of the fourteen purifiers) were also inspected. In passing through the yard, some German retorts were regarded with no small amount of curiosity.

Those present were then kindly invited by Mr. Browne to take tea in the Workmen's Institute; and after a short time had been spent in this pleasant occupation, a move was made in the direction of the Kennington storage station, which is some 600 yards from the works, and to which the gas is taken by one 30-inch and two 24-inch mains. The total gasholder capacity here is 10½ million cubic feet. During the winter time, two Sturtevant fans, driven by Tangye steam-engines, are used to draw from the works the gas, which passes through three station meters. To raise the gas at the inlet of the district governors to a pressure higher and more constant than the holders will give, four Sturtevant fans are employed—two of a capacity of 600,000 cubic feet per hour, each driven by a 37 indicated horse power Crossley gas engine; one of 450,000 feet per hour, driven by a 20 indicated horse power steam-engine; and the fourth of 250,000 feet per hour, driven by an 18 indicated horse power Crossley gas-engine. The latter fan, being placed tandem fashion upon the outlet of the 600,000 cubic feet fan, enables a pressure of 21 inches to be worked upon a trunk main conveying gas to consumers' mains at a distance.

At the conclusion of the visit, Mr. W. Booth said he thought they ought to cordially thank those—particularly Mr. Browne—who had so kindly shown them round the works, and also Mr. Carpenter for granting facilities for the visit. Mr. Browne said he was very much obliged to Mr. Booth for the kind remarks in which he had thanked him and his staff. It had been a great pleasure to them to do what they had done; and they regarded it as a compliment that the Association should pay them a visit. The works stood upon a very small area—in fact, the size of the site was only just half what theory said was necessary for the make of gas. They had to be operated as a high-pressure works; and everything had to be kept well up to the mark. The Hon. Secretary (Mr. Henry Capsey) said he wished to endorse what Mr. Booth had said with regard to the thanks the Association owed to Mr. Browne.

SCOTTISH JUNIOR GAS ASSOCIATION.

Western District.

The Annual General Meeting of the Western District of the Scottish Junior Gas Association was held on Saturday in one of the rooms of the magnificent range of buildings which have been erected in George Street, Glasgow, for the Glasgow and West of Scotland Technical College. Mr. J. Lowe (Glasgow), the President, occupied the chair; and there was a good attendance of members.

The President said they were met in premises which they occupied on the same advantageous terms as those they had last session, through the kindness of the authorities of the Technical College. There was, perhaps, just one drawback to their complete felicity, which probably some of the members would have already noticed, and that was that they had to conduct their discussions under the glare of the electric light, instead of under the kindly beam from the gas. The statement of accounts had been published. They had a balance in hand of upwards of £6, which he thought a creditable result for the first session.

On the motion of Mr. J. Bell (Airdrie), the accounts were approved.

The President proposed an alteration in Rule 10, relating to the nomination of office-bearers. He said they had not been able to comply with the rule, and he proposed that it should be altered so as to provide that nominations should be made at the annual general meeting.

The alteration was agreed to.

Election of Office-Bearers.

The following were then elected office-bearers for the year:—

President.—Mr. J. Bell, of Airdrie.

Vice-President.—Mr. J. M'Leod, of Provan.

Members of Council.—Messrs. J. Lowe, of Glasgow, D. S. Munn, of Dawsholm, J. Smith, of Glasgow, C. Fairweather, of Kilmarnock, A. Dow, of Kirkcaldy, and W. Wilson, of Kirkintilloch.

Hon. Secretary and Treasurer.—Mr. G. Braidwood, of Dawsholm.

Auditors.—Messrs. J. Smith and J. Mann, of Glasgow.

The President said they had now reached the first milestone in the history of the Association. The term of his occupancy of the chair had come to an end. A year ago they were looking forward with hope to the success of their new venture; and he thought their confidence had been, in some measure, justified by results. But if the prosperity and usefulness of the Association was to increase, as he believed it would, they must not relax their efforts. He therefore urged members to maintain their active interest in all its affairs, and to do all that in them lay to promote its prosperity, by reading papers, by taking part in the discussions, and also by regular attendance at the meetings. He knew that Mr. Bell, and those whom they had elected to be his colleagues in office, had the interest of the Association at heart, and that they would do everything in their power to maintain and increase its prosperity. They all knew Mr. Bell, and he (the President) need not make any introduction of him to the meeting. He would therefore call upon Mr. Bell to take the chair, and proceed with his address.

Mr. J. Robertson (Alloa) proposed a vote of thanks to the retiring President, to their worthy Secretary, and to the rest of the Council; and it was unanimously agreed to.

The Presidential Address.

Mr. Bell, having taken the chair, said:

I have to thank you for the high honour you have conferred upon me by appointing me your President for the ensuing session. We have reason, as an Association, to congratulate ourselves on the great success of our work during the past session; and this is mainly due to the labours of our Past-President, Mr. Lowe, and the retired Hon. Secretary, Mr. Mason, under whose able guidance, thus early in its career, the Association has been established on a sound foundation. The most useful part of the Association's work was the visits made from time to time to gas-works and manufactories closely identified with the gas industry; and these were fully taken advantage of by the members.

The papers submitted at the meetings were of a high standard; but some, from their very nature, did not appeal to the majority of the members. The consequence of this was that discussion on them was very limited. As a Junior Association, we must not be too ambitious in the subject-matter of our papers. From our experience of last year, members will see that the paper which would meet with the readiest response from the members of the Association is one dealing with the every day work of the individual member, such as describing some difficulty he may have encountered, and, if he has solved it, giving his solution of it, or directing attention to some improved method that may come within the scope of his employment, in whatever capacity. I address the members thus with a view to encourage them to come forward with papers such as I have indicated, as I believe many have held aloof because they could not submit a paper on advanced engineering on highly scientific lines.

At the same time it behoves us, as students of the gas engineering profession, to keep in touch with the latest developments in engineering, science, or commerce which may be applicable to our own profession; and, though members may not enter freely into a discussion on such papers, their usefulness to the Association cannot be gainsaid. During this session the members will have the opportunity of visiting various works; and I would strongly urge all to avail themselves of these excursions, as they are the most educative part of the Association's work—member

thus having access to works which as individuals they could not otherwise readily obtain.

From all parts of the British Isles we learn of a change in public sentiment in regard to street lighting. In many important centres, electric arc lamps are being discarded in favour of high-power incandescent gas-lamps; and where our cities lead the towns will soon follow. It only awaits the development of a satisfactory automatic system of lighting and extinguishing to hasten the final removal of the electric arc from our streets.

While we learn of the great progress of the gas industry throughout our country, I think we shall be forced to admit that much of this success is due to the advent of the prepayment meter; and as the consumers have become more familiar with the working of the meters, the troubles which were encountered on their first introduction have been very much reduced. I think that there are still many towns where their use could be largely extended with very little outlay of capital.

As juniors, it is ours to look into the future, and endeavour to fathom—and it may be to anticipate—on what lines the future developments of the profession may tend. In the carbonizing department, the conflict is inclines *versus* horizontals operated by machinery; and still more recently there has been revived the idea of a vertical retort. For medium-sized gas-works, however, the horizontal retort is likely to hold its own for many years to come.

Tar-extractors are likely to come into more general use, to ensure that no tarry matter will reach the scrubber, affecting the efficiency of this apparatus. The rotary scrubber of the present day, besides removing all the ammonia, eliminates a considerable quantity of other impurities from the crude gas; thus lightening the work of the purifier-boxes. Among the impurities falling to be dealt with after the scrubber is a small percentage of carbonic acid. But I think too much stress is laid upon the necessity of dealing with this impurity; for in our days of low illuminating power gas, consumed in atmospheric burners, this so-called impurity does not deserve the attention and expense entailed in its complete extraction. Recently some works have abandoned lime entirely, using oxide only, with revivification *in situ;* and it has been proved to be possible to continue a whole twelvemonth without opening a purifier, if the work of purification is evenly distributed. This can be accomplished by frequent and regular changing of the valves. When a system on these lines becomes more generally adopted, we may look for a change in the form of purifier, to admit of its being closed down for long periods, and to allow of any box being steamed at will. The water-lute will disappear; and even the rubber joint, in its present form, may give place to a more permanent joint, such as is in use for other parts of our plant which only require opening once a year.

Many things point to high-pressure distribution as a future development, as the desire for intensified incandescent lighting becomes more evident, and the demand for motive power increases in districts where ordinary pressure makes gas as a medium for such purposes an impossibility. I have already alluded to the likelihood of the more extended adaptation of automatic lighting and extinguishing of public lamps; and no doubt its utility for private consumers also (more especially in shops and warehouses) would be readily recognized.

During the last few weeks, some of you will have observed, in the columns of the "Gas World," an interesting controversy on the merits and demerits of the vacuum process of sulphate manufacture. The original writer claims for his plant the substantial yield of 35 lbs. of sulphate per ton of coal carbonized. As to whether this is due to the material he has to deal with or to the vacuum process, I am not in a position to give an opinion. Crystallization under vacuum has accomplished much in some other branches of the chemical industry, and should lend itself well to the manufacture of salts of ammonia. It remains for time to determine whether the plant erected on these lines shows economies equivalent to the extra capital outlay, as its eems, in other respects—such as cleanliness in working and appearance of the salt produced—to have advantages over the ordinary method.

I have dealt with the future of our manufacturing department, and only slightly on the distribution department. No doubt there is room for progress in development in interior fitting, and in dealing with the commercial side of our business. But I think I have said sufficient to indicate the direction of the outlook for the enthusiastic student of the gas profession, who should be ever ready to advance with the times, to select and adopt the best that presents itself, and be even prepared to step out in advance of the leading of the times, as opportunity occurs.

The President having invited discussion upon his address,

Mr. A. Wilson (Glasgow) said he had listened with very great interest to what had been said by the President, and he was sure that if the members thought over the various parts of the address they would be all the better for it. He mentioned that a great part of the benefit of the Association was in being allowed to visit various works, and there seeing processes of manufacture being carried on. This appealed, no doubt, in a much greater measure, to most of them, than hearing a paper read, or seeing a model. As to the papers, he thought it was a capital suggestion—and it was one he put forward himself last year—to give short, crisp papers, so that everyone who had any experience in the matter could enter into the discussion. As much good could be derived from the discussions as from the papers. Those read last year were of a very high quality; still, if what the President had suggested were followed out, he was sure it would do a great deal of good. It was said they were all students; and he, for one, did not wish to be anything else than a student of gas manufacture, for the process was becoming wider every day. Vertical retorts had been referred to. If they gave their attention to matters such as this they would be helping forward a good work. Those who went to the Oakbank Shale-Works, and saw the vertical retorts in operation there, had their eyes opened as to what might be done in works producing coal gas. Of course, the process was not quite the same, but it was very much on the same lines; and the clever way in which everything was handled, and at the minimum of cost, must have made some of their mouths water. He only mentioned vertical retorts as being one point which seemed to be coming to the front. There were ever so many more problems waiting to be solved; and the sooner the members of the Junior Associations started to tackle these problems, the better it would be for all of them. He was very loth to leave his house that night, but he felt he could not help coming to give the members a send-off for the session. The previous one was a credit to them all. The members deserved the highest congratulations which could be given them; and he had the utmost hope for the future, if they all stuck together, and helped the office-bearers whom they had elected. He proposed a vote of thanks to the President for his address.

Mr. W. Wilson (Kirkintilloch) asked if the President had an idea of any new prepayment meter which would cost half the price of the present ones. The capital outlay was rather heavy in connection with prepayment meters; but he thought that, even as things were, if men in small towns would put in a few of these meters they would be astonished at the result.

Mr. J. Lowe said he did not intend to criticize the address, to which he had listened with very much enjoyment. The remarks made by the President should be of great value to the members. What they wanted, as both the President and Mr. Wilson had pointed out, was not very long and difficult papers, but those which were of general interest, which dealt with some work actually done, and which many members would be able to discuss. The syllabus for the current year had been drawn up, and he thought the members would be delighted with it when they saw it.

Mr. J. Allan (Glasgow) thought they had not so much to fear competition by the electric light as by producer-gas plant, which was making serious inroads in the gas industry. He was speaking last week to an engineer who was putting in plant for a firm in Glasgow, and the estimate he made was that while a week's work with town gas cost £8, he expected to reduce this to £1 10s. with producer gas.

Mr. J. Robertson (Alloa) asked if the oxide would not cake in a purifier before it ran a twelvemonth.

The President replied that the capital outlay on prepayment meters depended, of course, upon the size of the installation they were going to put in. They all knew that the return from these meters amply paid any outlay upon them. They were getting a popular opponent in producer gas, but for motive power only; and he thought they could still manage to hold their own, even with this gas as a competitor. The efficiency of an engine worked by producer gas was recognized by all to be not so good as that of an engine driven with ordinary coal gas; and it was very costly to keep up. With regard to purifiers, he had to say that theirs had been running for six months, with oxide of iron containing 45 per cent. of sulphur when it was put in; and they had had no trouble with back-pressure. A few days previously he tested the purifiers, and found each box working with a pressure of 3·10ths. They worked in series of three on and one off. By turning the valve in a backward instead of a forward direction, they put the foul gas into the clean purifier. They allowed it to go on in this way for twelve hours; then they reversed again, and put another purifier on, and went on for twelve hours and reversed again. Instead of putting the clean gas into the first of the series, they brought it in at the last, so that the clean box got the first of the gas. The first one took up the sulphuretted hydrogen, the next was cleaning up, and the last one was getting no impurity to take up. The oxygen of the atmosphere that was being blown in was revivifying the box, so that it was clean when it came into operation again.

Mr. A. Wilson asked what percentage of air was used, and where it was put in.

The President: From 1½ to 2 per cent., put in by means of a steam-jet, at the inlet of the condenser.

Mr. W. Wilson asked what was the size of the purifiers, how many cubic feet of gas might have been put through them, and what percentage of sulphur the oxide contained when it was thoroughly saturated. Was there not danger of spontaneous combustion when it was taken out so fully charged?

The President replied that they had never yet had to take out oxide highly charged with sulphur. He did not know what it would be when it came out, but they expected to work up to a pretty high percentage. What this might be, he was not in a position to say. He expected, however, that in a very short time they would be putting in fresh oxide, which would run them through the whole of the winter. Their purifiers were 18 feet square, with three tiers of sieves; and the oxide was laid at a depth of 12 inches on each sieve. The quantity of gas passed would be about 19 million cubic feet.

No further questions being put, the proceedings closed.

GAS-LIGHTED SIGNS.

The current number of the "American Gaslight Journal" contains the following article by a writer signing himself "Observer," on the subject of the increasing use of the gas-lighted sign.

I notice that there are a great many more gas-light signs in use now than formerly. Some have supposed that the new forms of electrically-lighted signs would predominate; but, as a result of recent observations, I find there are a very goodly number of gas-lighted signs mingled in with those illuminated with electrical currents.

I find there are several descriptions of gas-lighted signs. The most popular and extensive are those illuminated by means of gas drawn from the house, office, or shop pipes. Another class consists of the signs illuminated by means of gas derived from carbide, on the acetylene plan. Then another class depends upon combination burners from which gases and vapours are derived by means of using the fumes of alcohol, gasoline, or kerosene. Hydrogen and oxygen gases are likewise drawn upon for this service; and the gases are confined in the usual types of metal cylinders.

The project of illuminating the sign of modern design by means of gas, is not unfrequently done on a plan very similar to that used in connection with the globes of the electric-lighted sign. Then, again, a case of metal is designed as in fig. 1, and the gas

Fig. 1.

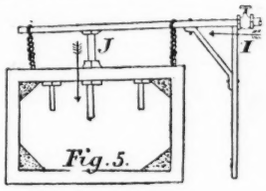


Fig. 5.

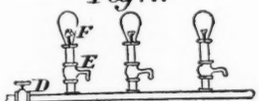


Fig. 2.

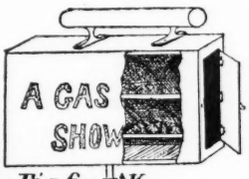


Fig. 6.

Fig. 3.

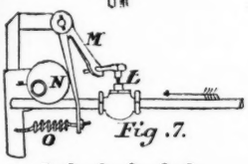


Fig. 7.

Fig. 4.

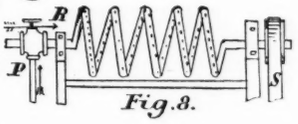


Fig. 8.

admitted to the burners through pipes. The case serves as a protecting medium for the gas pipes and jets, and also forms a surface on which the lettering may be described as shown. The letters are usually built up with sheet metal, the edges being lapped and soldered. In this sign the gas-pipe A receives the gas from the main and delivers it to the burners in the case through the section C. There is a check-valve at B to govern the flow of the gas. The arrangement of the burners inside the framework may be such that the gas can be supplied direct to each letter. The letter surfaces are bored through, and little tips inserted. The tips feed the gas, and when lighted the serial arrangement of tips forms the letters or figures.

Sometimes instead of the plan of the letter being described by a glare of a series of lights, the interior illumination is utilized to shine through the coloured glass forms as illustrated in connection with figs. 2 and 3. In the latter figure is shown the plan of letter construction on the face or side of a metal constructed case. The letters are raised, and the surfaces are furnished with coloured sheet glass. The arrangement of lights at the back of the coloured glasses is as fig. 2. The gas is supplied by the pipe D to the burners. E is the check-valve; and F, the globe and burner.

The plan of running a series of jets about the form of pipe letters is adopted in many places. Pipe-lines are used for this service, and the plan of arrangement is as shown in fig. 4. First the base-pipes are laid out as at H; then the joint is inserted for the delivery-pipe G, which joins with the main pipe of the building. Then the letters are properly shaped over forms, and each letter is secured to its proper position in the design to make the sign read as desired. Then comes the boring for the jets. Sometimes tips are put in; but in many cases these are not used, and the escaping gases are lighted on the pipe surfaces direct. This results in a serial line of many little gas-jets, which present an attractive appearance when all are burning in line.

Sometimes the plan involves the use of a frame supported out in front of the building for advertising purposes, on the plan shown in fig. 5. The framework is made of hard wood or metal, and is supported on a bracket. The upper part of this is pipe, and carries the gas in the direction of the arrow I from the gas-main to the frame. The gas is taken down to the frame through the joint J. Then the necessary lettering is planned, and the gas is supplied to these forms and lighted. The result is that a sign liberally illuminated with gas-jets is supported at a conspicuous point for advertising purposes.

Now and then we find the common form of gas-lighted tin-box, arranged on the plan shown in fig. 6. Light-weight sheet metal is employed for making the box. Then two or more lines of pipes are put in, and bracketed to the sides of the chamber. These lines carry the gas-jets, and when the jets burn the light penetrates the letter spaces. These are cut through the sides of the box, and are covered with coloured glass or mica. In this way colour presentations may be secured. The supply of gas to this description of box is through the pipe K.

In order to keep up with the demand, and cause the partial extinguishment of the lights, for the purpose of drawing the attention of the public to certain illuminated signs, the device shown in fig. 7 is used. This arrangement was designed by an acquaintance of the writer's who had use for it in raising and lowering the lights of an automatic tri-coloured sign. A wooden stand is erected in which is a bearing for the cam-shaft and cam N. This shaft is turned by motive power belt transmission from a shaft in the basement of the store while the lighted device itself is in the window. The object of the slowly revolving cam is to open and close the lever or handle of the valve L. The lever M is pivoted to a stud above on the frame, as shown. There is a spiral spring at O, and this retains the lever back in place except when the cam presses it out. Thus the lever opens and closes the valve, and the gas supply is regulated accordingly.

The writer noticed quite a curious rigging in one place where they were utilizing gas-lighted devices for advertising purposes. A spiral arrangement of gas-piping was formed, about 12 inches in diameter and 4 feet long, as shown in fig. 8. The straight ends of the pipe formed the bearing for the cylindrical device. This piping was bored for jets; and when lighted and revolved, the effect was strange. The arrangement rests in wood bearings. The gas supply is furnished through the pipe P to R, as shown by the arrow. The belt and pulley S give the necessary motion. In order that the pipe may revolve within the union of the valve, a jointed connection is made, which, when properly packed with rubber, avoids leakage of gas. This device is turned slowly, and makes a striking effect when the jets are lighted.

REGISTER OF PATENTS.

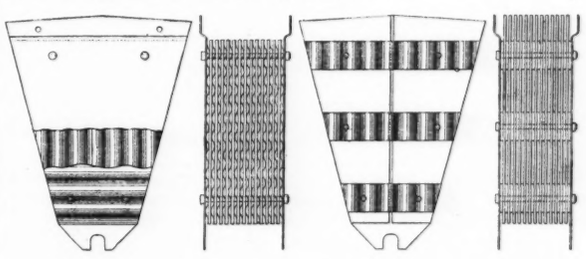
Incandescent Gas-Mantles.—Sutton, C. J., and Rudd, J., of Bolton. No. 24,400; Nov. 11, 1904.

Mantles for gas lighting made from fabric knitted with uniform tension from top to bottom often break with the slightest shock, the patentees remark in their specification. To remedy this weakness, they knit or weave the stocking by commencing with a very tight tension at the top and gradually slackening the tension to the middle and increase again gradually to the bottom. The stocking may be strengthened at the top or bottom by knitting or weaving more strands together or by attaching a separate piece to existing stockings, in order to strengthen them at their weakest points, either top or bottom, separately.

In the case of inverted mantles, the weakness is principally at the portion which is bound to the ring or holder; and they may be strengthened in the same manner at one end only—the end which is bound to the ring or holder.

Washers and Scrubbers.—Kirkham, Hulett, and Chandler, Limited, and Hersey, S., of Palace Chambers, Westminster. No. 24,467; Nov. 11, 1904.

This invention relates to apparatus wherein a series of discs rotating in bays or tanks, and each composed of a series of "bundles" or segments of material which afford a large wetted area, is employed; the "bundles" providing means of increasing the wetted area, and equal spacing apart of the washing surfaces.



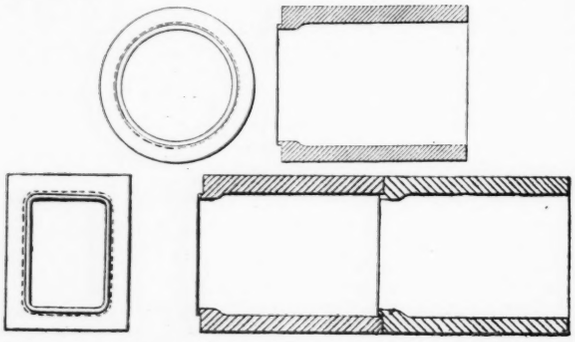
As shown, the patentees make use of sheets of corrugated metal or wire gauze, laid one against the other or against flat boards or other surfaces for separating the corrugated portions—the channels always

ensuring free passage for the gas and ready admission and escape of water into and from the interior of the "bundles."

In cases where the corrugated sheets are arranged between boards, the sheets may also be perforated, and the corrugations may be arranged either radially or at any suitable angle relatively with the axis of rotation. In some cases, instead of making the metal sheets the same size as the boards, strips of metal (which may be corrugated or indented) are fitted at convenient distances between them, or distance-pieces of wire gauze may be employed. When the corrugated sheets are placed one against another, the corrugations cross one another more or less, so as to prevent the ribs of one sheet entering the grooves of another sheet, and *vice versa*.

Regenerator Tubes for Retort-Settings.—Townsend, H., of Wakefield. No. 24,728; Nov. 15, 1904.

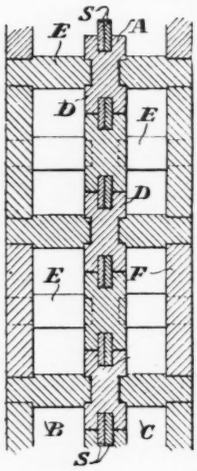
The inventor proposes to construct regenerator tubes for gas-retort settings with one end plain and the other end adapted to make a socket joint with the plain end of the next tube. The illustration shows how the invention may be applied to tubes of round and rectangular section respectively.



When the ordinary butt-jointed tubes, the patentee points out, become leaky, they are usually repaired with a lump of wet fire-clay put on with a flat rod; but the fire-clay is very liable to drop off. The joint he proposes, on the other hand, is accessible for repair either from the inside or the outside, and can be plugged up with fire-clay by simply ramming it into the small space between the socket of one pipe and the plain end of the next.

Regenerative Furnaces for Gas-Retorts.—Spencer, F., of Fulham, S.W. No. 24,787; Nov. 15, 1904.

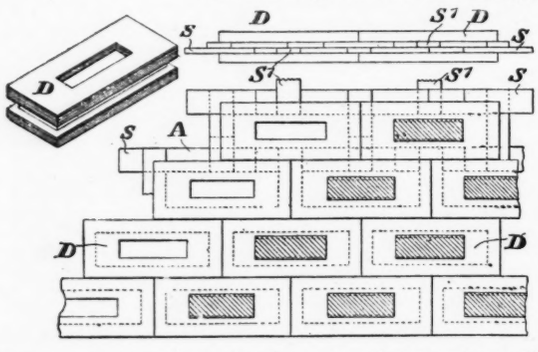
This invention consists principally in the construction of the waste-gas flues and secondary-air flues, and is applicable to furnaces in which the "baffle-system" is employed, whereby the current of hot waste gases descending and the current of secondary air ascending are broken and constantly divided by baffle-tiles or blocks, or their equivalents, placed for this purpose in each of the flues. All joints, both vertical and horizontal, between the tiles forming the wall are "effectively covered, so as to prevent any leakage or bye-passing from the waste-gas flues or passages into the air-passages, and *vice-versâ*, through the joints between the bricks."



The illustration shows a cross sectional elevation through the waste-gas and secondary-air passages or flues at one side of a furnace, a sectional side elevation, a plan of the top course, and a view of one of the division-wall tiles.

The division wall A between the waste-gas passage B and the secondary-air passage C is constructed of specially formed blocks or tiles D (one of which is shown), made of fire-clay or other suitable material, with grooves or rebates cut or moulded in all four edges, into which are inserted jointing tiles, splits, or pieces S, arranged so as to break joint in all directions both vertically and horizontally.

The tiles are provided on each face (or, in



some cases, on one side only) with a recess of rectangular or other suitable form into which the baffle-tiles E engage—being preferably shouldered at the edges (ends or sides) that engage in the recesses of the divisional wall tiles. When the outer walls of the flues are built up of dissimilar tiles or blocks to those employed in the division wall, one of the shouldered edges of the baffle-tiles is made shorter than the other.

In building the wall as described, one or more of the jointing tiles S in the grooves on the horizontally disposed edges of the wall tiles D are arranged vertically (as indicated at S^1), so as to protect or cover the horizontal and vertical joints between the jointing tiles and the vertical joints between the tiles D forming the wall. The jointing tiles in the grooves in the vertically disposed ends of the bricks or tiles are arranged vertically, and so as to break joint.

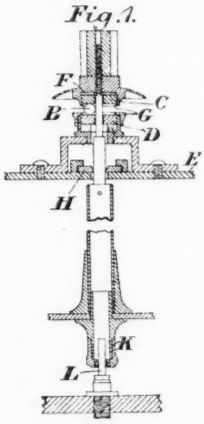
Plain tiles or bricks F are employed in the outer walls, and the baffle-tiles E are provided with an elongated shoulder or reduced part at one side, which is placed between the adjacent edges of the tiles F, the shorter shouldered parts of the baffle-tiles being supported in the recesses of the division-wall bricks D. The bricks or tiles of the outer walls may, however, be provided on the inner faces with recesses similar to that of the division-wall tile D shown, and a short shouldered or reduced part is then provided at each side of the baffle-tiles E which engages in the recess in the outer-wall tiles C and division-wall tiles D respectively.

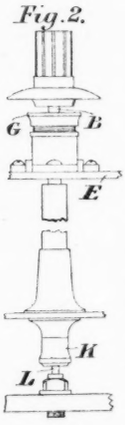
Rotary Meters.—Thorp, T., of Whitefield, Lancs. No. 24,832; Nov. 16, 1904.

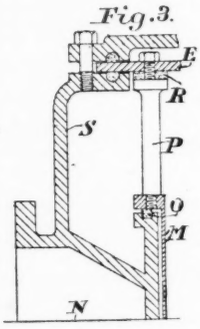
This invention relates chiefly to the fluid meters described in patent No. 20,214 of 1901 and No. 6017 of 1903.

The first improvement has reference to the bearings of the measuring or indicating fan, with a view to obtaining a frictionless bearing not liable to deteriorate through corrosion—see figs. 1 and 2. The first view represents a sectional elevation of a fan spindle and bearings, and the second view an elevation.

The upper part of the spindle is supported upon a ball-bearing consisting of a metal ball B between two annular discs or races of agate, one of which (C) is carried by the spindle, and the other (D) by the foundation plate E. The ring D is fitted in a socket secured to the plate, and the spindle passes through clearance holes in the socket, agate disc, and foundation plate. The disc or ring C is fitted in an inverted socket fixed to the upper part of the spindle, and is set upon a bed F of yielding material—rubber or felt. The disc D also is preferably set upon a similar yielding bed. Both discs are each held in position by a ring G; and these rims also serve as a guard to retain the ball B in the races C and D. Where the spindle passes through







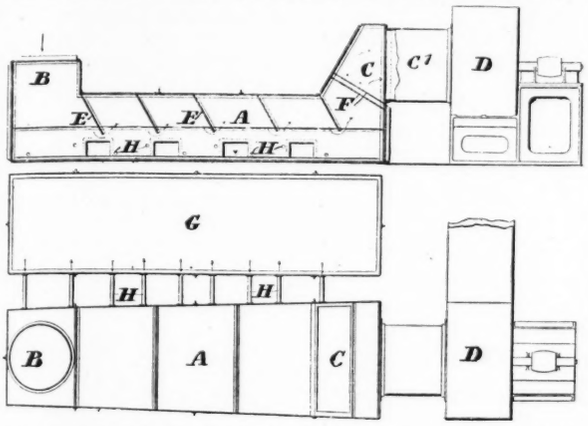
the foundation plate, there is shown another agate disc or ring H secured in a socket, and which serves to check the escape of gas to the index chamber of the meter. This ring fits closely to the spindle, but permits the latter to turn easily therein. The lower end of the spindle carries another socket K; and this is preferably formed so as to secure the fan-wheel to the spindles. The socket K is fitted with an annular bush of agate, which is immoveably fixed therein with its hole in the axis of the spindle. The spindle is retained in position in relation to the meter by a fixed or stationary stud L of metal, which enters the socket K through the centre hole in the agate ring—thus forming a vertical bearing for the spindle.

The second improvement has reference to the joints of the foundation plate of the mechanism between the fan or measuring chamber of the meter and the plate and between the latter and the cover of the index mechanism. This is illustrated in fig. 3, which shows a sectional elevation of the inlet side of the meter casing. In order to facilitate the removal of the measuring and indicating mechanisms, an annular gas-tight joint has to be made between the measuring chamber and the inlet cavity in the casing; and another annular gas-tight joint has to be made between the foundation plate of the mechanism and the body of the meter, which includes the measuring chamber. Yet another joint between the hood and the plate has to be made. As it is desirable that these three joints should be made and broken by pressure and release and in one operation, one of the three joints must yield more than the other two. The lower joint is made between the lower part of the measuring chamber M, which depends from the foundation plate E by pillars, and the inlet chamber N; and between these parts is inserted a flexible ring O of yielding material—such as lamp wick soaked in tallow or the like. Between the ends of the pillars P and the foundation plate E is inserted a packing R of some yielding material (such as felt, for instance); the pillar being secured to the plate by a screw passing through the packing. Between the foundation plate E and the casing S is inserted another similar packing ring, and also another such ring between the hood of the meter and the foundation plate. A single row

of set-screws or bolts passed through the flange of the hood and that of the casing will now equally tighten the three annular joints referred to; the felt packings of the pillars yielding to the desired extent.

Washing Gases.—Capell, G. M., of Stony Stratford. No. 24,903; Nov. 16, 1904.

The patentee proposes to make use of a fan (preferably a suction fan) for introducing the gases into an expanding chamber, containing water up to a certain level. The smallest area of the chamber is at the end where the gas is drawn in; and in this chamber is fitted a number of vertical or inclined shutters, which can be varied and so arranged that the one nearest the gas-inlet is immersed more deeply in the water than that adjacent to the exhaust fan. The water inside the chamber may be connected with a tank outside the gas-chamber by pipes arranged so

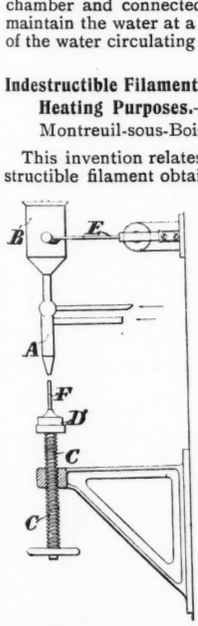


that the connections are on one or both sides of the shutters which dip into the water forming the water-seals. The portion of the chamber nearest to the fan can be raised above the water-level to a height of 3 to 5 feet or more. In this portion, a series of perforated shelves may be put, with coarse asbestos cloth or other suitable material on them to absorb any moisture the gases may have taken up in their passage under the water seals of varying depth.

In the sectional elevation and plan shown, A is the rectangular chamber containing the washing water—narrower at one end than at the other. B is the inlet for the gases to be washed—arranged at the narrower end of the chamber. C is the upward extension with which the chamber is provided at its larger end. D is the fan which communicates with the extension, by the passage C^1, and draws the gases to be washed through the inlet B and thence through the chamber, as indicated by the arrows. E are the shutters fitted within the chamber—here shown arranged at an inclination to the vertical and of different lengths, so that the one nearest to the inlet is immersed in the water most deeply and that adjacent to the fan to the least extent. F are the perforated shelves covered with coarse asbestos cloth, which are fitted within the chamber extension for retaining any moisture gathered by the gases in their passage. G is a water-tank arranged laterally of the chamber and connected with it by the pipe H; the object being to maintain the water at a constant level within the chamber and permit of the water circulating (as shown by the arrows) and cooling.

Indestructible Filament for Gas and Electric Lamps for Lighting and Heating Purposes.—Michaud, G., of Paris, and Delasson, E., of Montreuil-sous-Bois (Seine). No. 27,707; Dec. 19, 1904.

This invention relates to the manufacture of a refractory and indestructible filament obtained by the fusion of magnesia, silica, lime, or alumina, and made of any desired shape; being designed to be brought to incandescence either by a gas-burner or by the passage of an electric current.



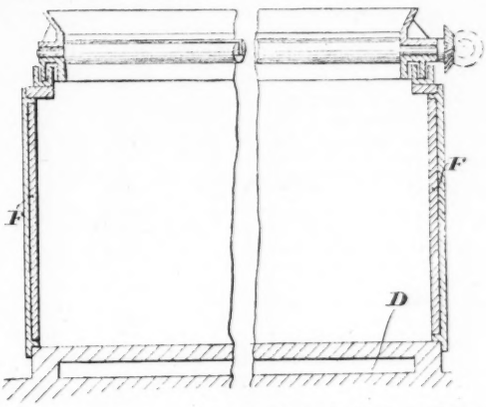
This filament is obtained by means of the apparatus shown. It consists of an oxyhydrogen blow-pipe A surmounted by a feeding reservoir B, which contains the primary substance, namely, magnesia, silica, lime, or alumina. Below the blow-pipe is a vertical screw-thread rod C, which can be raised or lowered a length equal to that of the filament to be obtained. On the top of the screw is fitted an aluminium cap or support D, on which impinges the flame from the blow-pipe, which effects the fusion of the material as it comes from B. The descent of the material is caused by an electric striker E producing vibrations which compel the material, previously reduced to fine powder, to flow through the central tube of the blow-pipe and fall in a thin filament on to the cap or support D. There it melts; and, by causing the support to descend in proportion to the fusion, a filament F is obtained, the diameter of which accords with the aperture of the tube through which the material flows.

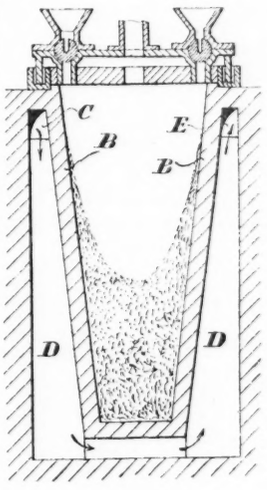
The light produced by the incandescence of filaments obtained by the process can be variously coloured by adding different metallic oxides to the lime, silica, alumina or magnesia employed—particularly oxide of chrome (sesquioxide), which is mixed in suitable proportions, for example 2¾ per cent. By the addition of this chrome, a colouring is obtained which deprives the mantles produced by the process of the slightly greenish appearance which they would otherwise possess.

Manufacture of Illuminating Gas.—Busse, P., of Crosta, near Bautzen, Germany. No. 26,246; Dec. 2, 1904.

This invention relates to a process and apparatus for the manufacture of illuminating gas by a continuous coal-feeding chamber of the horizontal coke-oven type; the object being "to produce a gas of greater illuminating power as well as a large yield in a short time.

In commencing his specification, the patentee remarks: "In ovens of this class, which heretofore could not be employed with advantage, the





usual method of working is to charge them up to the top with coal, and allow the heat to spread from the bottom and sides through the mass. The effect of this is that the resulting hydrocarbons [tar products] are either condensed in the core of the charge, and then suffer decomposition as the temperature increases, or as the products ascend from below they are obliged to pass through the heated strata above, and are thereby decomposed. In either case, the lighting and heating power of the gas is decreased. Owing to this defect, the use of ovens of this type for the production of illuminating gas has been limited, although they have great advantages as far as attention is concerned."

According to the present invention, the coal is allowed to trickle down continuously in the form of a thin layer over the side walls of a chamber—preferably arranged in the same manner as a horizontal coke oven—the surfaces of which are preferably sloped inwards towards the bottom at such an incline as to prevent a too rapid descent. The chamber is heated from the outside in any convenient manner; the ends of the chamber being provided with means whereby, when the coal is completely converted, the solid residue may be expelled by a mechanically-operated pusher.

As will be seen from the engraving, the chamber is arranged in a similar manner to the chambers in horizontal coke-ovens, though the lateral walls B are given a suitable slope. The roof of the oven is provided on both sides (just over the inner surface of the side walls) with appliances—such as rotatable slotted shafts or the like—by means of which the coal is introduced slowly and continually in such a manner that it trickles down the side walls of the chamber in the form of a thin layer. On reaching the bottom, the coal piles itself up against the side walls, where it forms a comparatively thin layer with a large upper surface.

The chamber is heated by some suitable form of gas-furnace; the heated gases entering the outer chamber or flue D through the inlet C, passing under the chamber to the outlet E, preferably in such a manner that the sides down which the coal trickles are the most highly heated.

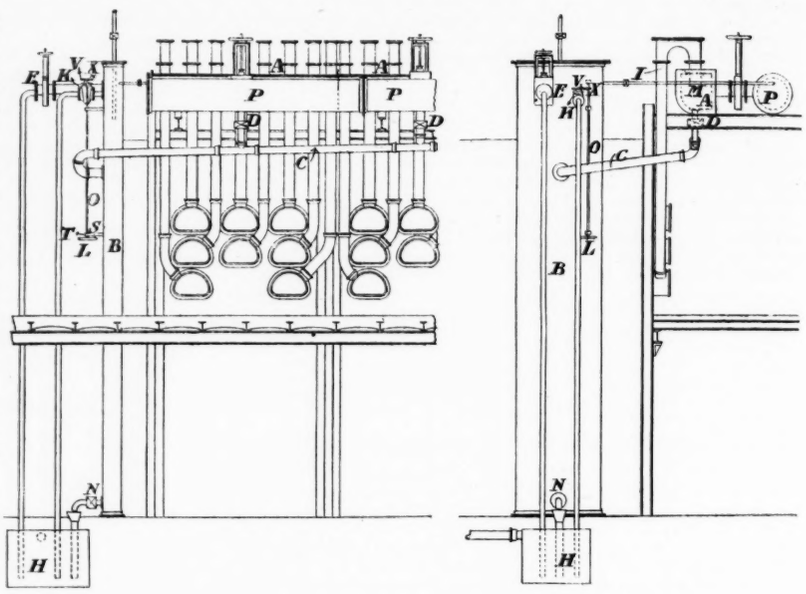
The heating flame, the patentee remarks in conclusion, may be either ascending, descending, or alternating. In the latter case, the method of feeding the coal at two sides of the oven has the great advantage that it enables a larger quantity of coal to be fed to the side at which the gas flame enters the oven than to the side at which it leaves.

Removing, Restoring, and Adjusting the Seal on the Dip-Pipes of Gas-Retorts.—Townsend, H., of Wakefield. No. 25,050; Nov. 18, 1904.

The hydraulic main A is connected to a tar and liquor tower B by means of a pipe C, with a sufficient fall towards the tower, running below the level of the hydraulic main; and each part of the hydraulic main is connected at the bottom to this pipe, a valve D being fixed upon the connection, so that each part of the hydraulic main can be shut off from the tower if desired. The tower is filled with liquid (preferably ammoniacal liquid) supplied by an overhead tank, to such a height as to give the required seal on the dip-pipes M. A weir-valve E is fixed on the face of the tower, to adjust the seal on the dip-pipes at discretion. The surplus liquid overflows over the weir-valve and is conducted down a pipe fixed to the valve into a closed seal-pot H, in which it is sealed, and whence it runs off through a main into the tar

and liquor well. The top of the tower is closed in; and a pipe I from the foul-gas main P (provided with a valve to shut it off when required) is connected to the tower so that there is the same pressure or vacuum on the top of the liquid in the tower as in the hydraulic main, which keeps the apparatus in equilibrium.

Another valve K (which is the special and essential feature of this invention) is fixed on the tower B, so that (when open) it reduces the height of the liquid in the tower several inches, and so removes the seal from the dip-pipes. The liquid overflows from this valve, through a pipe attached to it, into the seal-pot H, where it is sealed, and so escapes into the tar and liquor well. When it is desired to restore the seal to the dip-pipes, the valve K is shut, and liquid is run into the tower from the overhead tank until it overflows over the weir-valve E. The valve K can be furnished with gearing, shafting, and hand-wheel so arranged that it can be easily worked from retort-house floor or other convenient position. This may be done in several ways, but preferably by means of a hand-wheel L attached to a vertical shaft O, on which is keyed a spur-wheel X, which is in gear with another spur-wheel V, fixed on the plug of the valve K, which is preferably of the solid-bottom gland type.



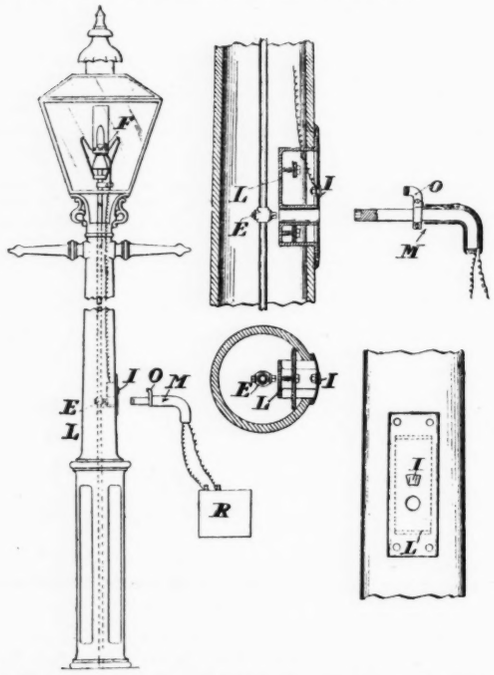
These spur-wheels are so arranged that one complete turn of the wheel L opens the valve K; while a complete turn in the opposite direction shuts it. A pin S is fixed on the wheel, which shows the workman whether the valve is open or shut; and all that he has to do is to turn the wheel until the pin S touches the pointer T on the one side, to open the valve K and remove the seal from the dip-pipes, and to turn it in the reverse direction until the pin touches the pointer on the other side in order to close the valve, and restore the seal to the dip-pipes.

The tower B is provided near the bottom with a cock N furnished with a spout fixed over a funnel, attached to a sealed pipe in the seal-pot H, so that all the tar which automatically flows into the tower from the hydraulic main as soon as formed can be removed when desired, and run into the tar-well, "which ensures a liquor seal whenever the dip-pipes are sealed."

Lighting-up Street and other Gas-Lamps with Burners Beyond Reach of Hand.—Pare, W., of West Bridgeford. No. 381; Jan. 9, 1905.

This invention relates to street or other gas-lamps to be electrically lit-up by a sparking circuit and an electrified pole, key, or similar contrivance carried by the lamp-lighter.

The illustration shows a street-lamp with an "electrified key," also a vertical section (on a larger scale) of a portion of the lamp and electrified key, a cross section, and an elevation less the key.



The gas pipe passing up through the lamp-post supplies the burner in the ordinary way; but the tap E for turning on the gas is arranged low down within reach of hand. A portion of the burner is made to form one of the sparking tips; the other sparking tip F being adjacent so that the gas-pipe becomes, for the time being, one of the conductors of the circuit from the gas-tap as the terminal. The sparking tip F is connected by a wire, disposed within the hollow interior of the lamp-post, to a conducting terminal I adjacent to the gas-tap. This terminal is rigidly carried upon the exterior of an insulator piece, which is connected to a frame L, which is fixed within an aperture in the lamp-post, to provide a mounting for the terminal and also a guide for the shank of an electrified key M, by which the gas is turned on and the sparking circuit made. The key carries upon it a contact maker O, electrically insulated from the body and shank of the key. It is connected by a wire to one of the terminals of a battery R carried by the lamp-lighter; the body and shank of the key being electrically connected to the battery by a wire.

The lamp-lighter carrying the battery R and key M inserts the shank of the key so as to first engage the plug of the tap E. He then turns, on the gas and causes the contact-maker O to wipe over the conducting terminal I so as to close the sparking circuit; the tap E being still engaged by the key.

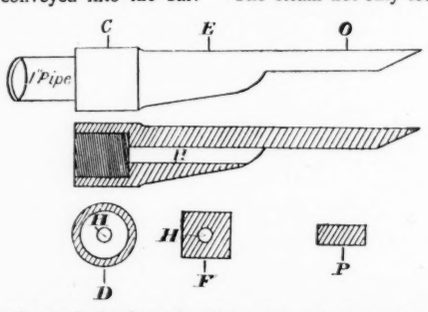
Padlocks for Gas-Meters.—Glover, R. T., of Queen Victoria Street, E.C. No. 421; Jan. 9, 1905.

The object of this invention is to construct a padlock that, after it has once been opened by anything but the proper key, cannot be re-locked except by the proper key. The tumblers and bolt are of the ordinary construction; but the hinged portion of the bow is made with a slit or slot, into which a plate, or strip, lever, or other appliance can be passed or pressed by a spring when the bow is opened—the plate or strip being acted upon by an extended or extra bit of the proper key, so as to remove it from the bow and allow the bow to be pressed down and the bolt shot home. This insertion of the plate keeps the bow open and prevents it being locked by any other than the proper key.

Now should the tumblers be lifted and the bolt withdrawn from the bow by any key other than the proper one, the bow can be opened, and after opening will become locked in the opened position; the locking strip not being interfered with by the key. It will therefore be impossible to relock the padlock until the proper key is inserted, thus indicating that the padlock has been surreptitiously opened. The invention is specially applicable for use with the money-drawers of coin-freed gas-meters, as by its use the inspector or collector on examining the meter will see at a moment whether the lock has been interfered with—he alone having the proper key.

Scurfing Bar for Gas-Retorts.—Parker, J., of Huntingdon. No. 3959 Feb. 25, 1905.

This is a steam scurfing bar, to clean off the carbon that collects on gas-retorts. It is made of cast steel, with a ⅜-inch hole through the centre H. The part E F is tapered so as to bring the steam as close as possible to the end of the bar which forms the blade O P. The end C D is turned and bored so as to receive a 1-inch pipe, through which steam is conveyed into the bar. "The steam not only loosens the

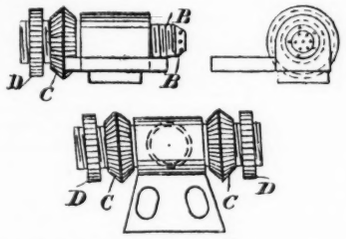


carbon, but keeps the blade cool, which is the main thing when scurfing retorts." After the retort is drawn and the steam connected to the bar by flexible tubing, the bar is ready for use. It is placed at the commencement of the carbon, and the steam turned on. It is then followed up and does the work of chipping off the carbon.

Gas-Stove Burners.—Fletcher, Russell, and Co., Limited, and Neil, J. & W. R., of Warrington. No. 6408; March 27, 1905.

This invention relates to gas-burners in gas-fire stoves, "to enable the relative proportions of gas and air to be more easily regulated in a burner of the bunsen type, and the gas and air to pass into the mixing-chamber and be more intimately mixed therein without impinging on the interior sides of the mixing-chamber and thereby avoid friction."

In the illustration are shown a side view of a two-way jet with one of the nozzles detached, an end view, and a plan of the two-way jet complete with nozzles.



The patentees form a screw thread on the jet B and taper the end. They drill several small holes around the tapered portion, and also in the flat face of the jet. A nozzle C is formed, either with or without the ring D on the shank. A screw thread is put on the interior of the nozzle to screw on to the jet B, and there is a bevel in the socket at the base of the screw thread at an angle corresponding to the angle of the taper on the end of the jet B, so that the bevelled portion of the socket fits perfectly on the tapered end of the jet when the socket is screwed on.

In order to regulate the supply of gas passing from the jet B to the mixing-chamber A, the socket is either screwed up tightly against the tapered portion of the jet—thereby preventing any gas passing through the holes in the tapered portion, the gas then only passing from the jet through the holes in the flat face of the jet. But if an increased quantity of gas is required, the socket is more or less unscrewed, allowing either a very small quantity or a larger quantity of gas as may be required to pass from the holes in addition to the gas being emitted from the holes in the face of the jet.

Extraction and Purification of Sulphur.—Cornillaux, A. V., of Deville, France. No. 7616; April 10, 1905.

This invention provides, it is said, "a simple, economical, and very efficient process for the extraction and purification of the sulphur from the substances which have served for the purification of illuminating gas after the solution of the sulphur therein by the bisulphide of carbon of a tar-eliminator." The material used is coke or coke dust—preferably that coming from metallurgical workshops, the hydrocarbons of which are not exhausted; such coke being acidulated in desired proportions, or not acidulated. The coke or coke dust, when acidulated, ought to be acidulated by means of concentrated sulphuric acid in the proportion of 2 to 10 per cent. This special coke has the power of retaining all the tar with which the solution of sulphur is contaminated. Coke coming from gas-works may also be employed; but it is less powerful. The bisulphide of carbon having been brought into contact with the substances which have served for the purification of gas, the resulting solution of sulphur and tar is thereafter passed across or through a bed or layer of acidulated coke or coke dust, which detars and purifies it, and it escapes or "is left altogether clear, and the sulphur becomes at once quite yellow and commercial." The process has a double advantage—it refines the impure sulphur, and the coke which has served for the elimination of the tar from the sulphur, when it is overcharged with tar, can be utilized for combustion purposes.

Gasholder Tanks.—Creeke, R. W. B., and Barker, J., of Leven, N.B. No. 7775; April 12, 1905.

The object aimed at by the patentees is to construct tanks for containing gasholders, that they may be cheaper and more durable than those presently in use, by making them of a combination of steel and cast iron, or of malleable iron and cast iron—that is to say, the bottom

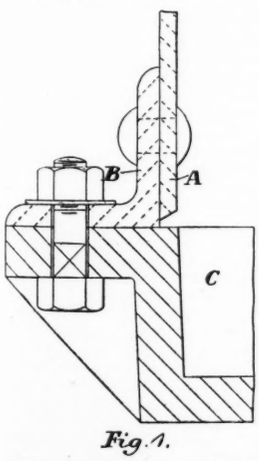


Fig. 1.

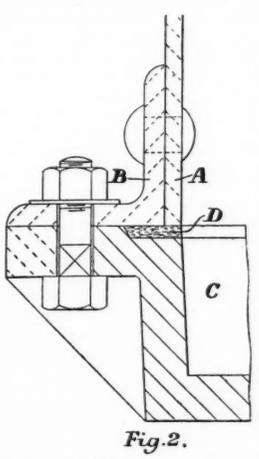


Fig. 2.

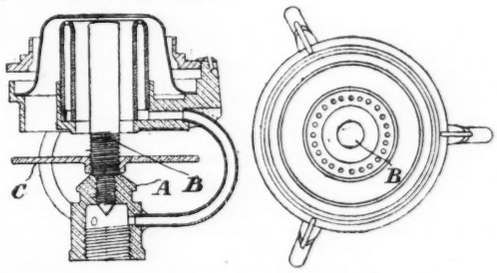
will be of cast iron and the sides of steel or of malleable iron. Figs. 1 and 2 are details of the mode of jointing the sides to the bottom.

A is the steel plate, B the angle iron, and C the cast-iron bottom; while D is a rust or cement joint or jointing material.

In tanks, the bottom is generally below the surface of the ground, the inventors mention, and is liable to corrosion, while it cannot be readily got at for repair. As cast iron is least liable to decay, such a material is most suitable for the bottom; while steel or malleable iron does perfectly for the sides—such a combination giving a tank which is, "taking everything into consideration, more durable than steel-plate tanks constructed in the usual manner, being less subject to deterioration by rust or corrosion."

Testing Burners.—Carpenter, C., of the South Metropolitan Gas Company. No. 13,553; July 1, 1905.

This invention relates to the testing of gases for ascertaining their illuminating value, in regard to which the patentee remarks: "Unless burnt with a fixed length of flame (to which method objections have been raised), it is not possible to test the illuminating value of the various gases supplied to the public on account of the variations in the proportions of their constituents—such difficulties chiefly arising from the fact that the apparatus employed for testing the gas is specially constructed for use with gas of a particular quality or known composition, and no means are provided for altering the apparatus in any way to make it suitable for gas of a higher or a lower quality, or of a different composition. In testing apparatus for the purpose mentioned, it is usual to employ an argand burner with a glass chimney; the chimney and air passages of the burner being so proportioned as to develop the full illuminating power of a gas of known composition. But if it is attempted to use the burner with gases of different composition, the air admitted for combustion may be in excess, or deficient, according to the composition of the gas; and, consequently, the test is of no value for comparative purposes. It has been proposed to obviate this difficulty by burning the gas under test at whatever rate would be required to practically fill the chimney with flame; but this procedure requires that the consumption of gas shall be varied according to its composition—a less quantity of a rich gas being required to fill the chimney than when the gas is poor."



The patentee has found that the "Wandsworth" argand burner, or any similar burner of fixed dimensions, can be used for ascertaining and comparing the illuminating power of gases having different compositions and values, even when burned at a fixed uniform rate, if the flow of air to the inner and outer surfaces of the flames is capable of variations and adjustment; and the object of his invention is "to provide simple and efficient means for obtaining this variation or adjustment, whereby the testing of gases of varying composition with the same burner may be readily effected."

To carry out the invention as applied to a "Wandsworth" argand or similar burner, there is attached to the socket of the burner a threaded pin on which is mounted a plate or disc, which may be flat or hollow, and which can be raised or lowered by turning it on the screw-thread of the pin. The volume of air currents flowing upwards to the inner and outer surfaces of the flame may thus be varied simultaneously.

A is the socket of the burner, to which the threaded pin or peg B is secured in any convenient manner. Upon the peg is mounted the plate C, the diameter of which is such that it will cover the inlets both for the outer and inner currents of air to the burner. By screwing the plate up or down on the peg, the air-inlets are contracted or enlarged as required.

APPLICATIONS FOR LETTERS PATENT.

19,993.—Ahrendt, H., "Inverted burners." Oct. 3.
19,995.—Hutmacher, J. A., "Carburation of gas." Oct. 3.
20,066.—Schiefner, T., "Mantles." Oct. 4.
20,088.—Glover, J. G., "Incandescent lamps." Oct. 4.
20,124.—France, G., "Incandescent burners." Oct. 5.
20,166.—Lucas, P., Incandescent lamps." Oct. 5.
20,185.—Mudd, J., and Jepson, R. L., Ltd., "Incandescent gas-lamps." Oct. 6.
20,206.—Darwin, H., "Incandescent burners." Oct. 6.
20,213.—Dransfield, E., "Suspension gas-light." Oct. 6.
20,286.—Howell, H., "Incandescent burner cluster for inverted lighting." Oct. 7.
20,317-8.—Brown, J. H., "Regenerative furnaces." Oct. 7.

Good News for Mantle Makers.—The energetic Manager at the Cape of the South African Lighting Association (Mr. W. Arnott) recently visited the Victoria Falls, and subsequently joined the members of the British Association at Kimberley. He returned to Port Elizabeth on the 19th ult., bringing with him an interesting collection of curios, which are now on view at the premises of the Company. They include a sample of Ramie cotton as grown; and as this is now largely used as the basis of mantles for incandescent gas lighting, it is satisfactory to learn from him that a very great quantity of this cotton is growing wild round the Falls. It is said to be a plant which stands any amount of drought. This, indeed, is self-evident, seeing that there has been no rain in the district of the Falls since January.

MISCELLANEOUS NEWS.

CROYDON COUNTY COUNCIL AND ELECTRICITY.

Discussion Resumed and Again Adjourned.

On Monday of last week, the Croydon County Council—the MAYOR (Alderman Allen, J.P.) in the chair—resumed the discussion on Mr. Price's motion: "That the further consideration of the report on street lighting be reconsidered at a future meeting of the Council; and that, in order that the matter may be fairly considered, the Lighting and Electricity Committee be requested to obtain, from the Croydon Gas Company and from the South Suburban Gas Company respectively, offers for the efficient lighting of the borough, and to submit such offers to the Council." In the "JOURNAL" for Sept. 26 (p. 827), Mr. Price's remarks in moving the resolution were reported; but, at the conclusion of his speech, the discussion was adjourned. On its resumption last week,

Alderman MILLER said that the question raised by Mr. Price was a very important and far-reaching one. In May, when Mr. Price raised the point, he (the speaker) fancied he could see the hands of Mr. Price, but that he could hear the voice of the Gas Company. This had been thoroughly borne out by the events which had since taken place, because they had not only Mr. Price advocating a return to gas for street lighting, but they had had a manifesto on exactly the same lines from the two Companies who supplied the borough of Croydon. He wanted to treat the matter on its merits, so far as he possibly could. These were, as was stated by the Committee in their report on the street lighting, that they wished to treat the question on commercial lines; and, giving light for light—candle power for candle power—they said that they were able to more than hold their own. This he repeated. But the Companies went on somewhat of a side-issue, and said: "No, no. You must take this on the question of mileage of streets where we work, and ours comes out at £55 per mile, and yours was something like £500 per mile." But they took certain roads where the lamps were 200 yards apart. There had been no mention by Mr. Price as to the condition of the street lighting. They found that Croydon had a central thoroughfare—a main street running right through the borough—and two or three other streets which might fairly be considered main streets; and there were side streets where they did not require the large volume of light that they did in the centre of the town. He ventured to say that during the last ten years the traffic in these streets had increased ten times; for they had trams carrying upwards of 14 million passengers a year, motor omnibuses, motor cars in abundance, and cycles by the thousand. What would be the condition of these streets if they went back to gas? It would be a positive danger to life for people to walk about the streets without plenty of light; and they said, and still repeated it, that plenty of light must be given at a certain altitude, and that they must have this light thrown backwards and forwards. If they had it on a level with the gas-lamps, it was simply thrown on the pavements, and they did not get the light distributed along the road that they did with the arc light. This was one of their chief contentions with regard to arc lighting. Mr. Price had told them what appeared to be somewhat of a fairy tale of other towns. He had mentioned the City of London. He (the speaker) would like just to refer to one or two of the towns Mr. Price had mentioned. As to Hull, they found the borough was supplied by arc lamps in new streets constructed by the Corporation. In another portion of the town, the department also lighted other streets, but with Nernst lamps. Then with regard to Liverpool, it had been said that there gas had been found superior to the electric light, and that the whole city was lighted by incendescent gas. The Bradford Corporation were also mentioned as preferring gas for street lighting. He read what the Engineer of Liverpool said:

> In reply to your letter of yesterday's date, I have never been able to trace the source of the statement to which you refer—viz., that in Liverpool incandescent gas-light has replaced the electric light. It is about nine years since the first electric arc lamps were installed by the Corporation for lighting some of the principal streets of the city, and this arc lighting has been from time to time considerably extended; but never from the commencement has any electric lighting been discontinued or replaced by gas.

This contradicted the statement sent broadcast by the Gas Company. Now he would come to Bradford. The reply to his inquiry was:

> There has been no instance in Bradford in which public street electric lamps have been discarded and replaced by gas. As, however, you may be possibly aware, the gas supply is in the hands of the Corporation, and the Gas Department do the street lighting at a very low price—in fact, until within the last twelve months did not charge for it at all, but lit the streets free. Even upon the routes where we have arc lamps, the gas lighting has not been done away with, but continues in use side by side with the electric light. We have only 51 arc lamps.

Islington was another place where it was said they had discarded the electric light. The reply from there was:

> Referring to your letter of the 23rd inst., I beg to say that gas has never been substituted for any portion of our electric street lighting system, and I can only suggest that this is one of the many deliberate misstatements promoted by the gas companies throughout the country. At the present time we have nearly 500 arc lamps in the streets of the borough, and 30 are being erected and will be connected within the next three weeks. Of course, we have from time to time carried out experiments in various side streets with half-a-dozen lamps at a time, of the Nernst or incandescent variety, and also with some premature flame lamps which were kept going for a few weeks and then removed as unsatisfactory; and it is possible that the Gas Company noticed the removal, and worked up a case accordingly.

The City of London, as they had been informed by the street lighting report, was lit by the lowest type of electric lamp in existence. They had never decreased the price or given better lighting; but, for reasons of their own, they had recommended that the electric lamps should be discarded and gas re-used. Then there was the case of Westminster. What did they find at Westminster? The St. James's and Pall Mall Electric Supply Company said:

> From the 9th of November, 1896, to date, we have had a contract with the Westminster City Council for the supply and maintenance of some 70 lamps for the sum of £30 per lamp per year; the Council providing originally the lamps and posts, and we mains and connections. Notice of the determination of this contract was given to us for this year; and the Gas Company made a determined effort to take the work from us. We have, however, secured a fresh contract for five years, at the reduced rate of £17 per lamp, on condition that we raise the candle power of each lamp from 700, as measured by the City Engineer's photometer, to 900-candle power; and this we have undertaken to do. There is no question, therefore, of our not securing the renewal of the contract.

Then as to Battersea, it was said:

> Battersea have decided to light the whole of the Nine Elms Ward with electric light, at an estimated cost of £15,140.

So much for these particular towns. He would just for one moment refer to the history of arc lighting in the borough. They had on their books 24 resolutions, which he thought had been voted fairly unanimously by the Council, in favour of lighting by arc lamps. He referred to them because it had been said in the Council Chamber that he, as Chairman of the Committee, had used a certain amount of influence to get electricity employed instead of gas. This he entirely denied. They had voted on 24 occasions for arc lighting in the borough; and therefore the responsibility for this lighting rested with the Council. There were one or two other matters he might mention. They had made great strides with electric lighting in a very short time. There was the little town of Frome, in Somersetshire, which had discarded gas; while Maidstone and Wimbledon, he believed, had no gas-lamps at all. There was another question—viz., economy. Mr. Price had said, in the most airy manner: "It is very unfortunate that you have spent £13,500 on your arc system; but, having done so, it is expedient, in the interest of the ratepayers, that you should go back to gas." It was very well put—throw £13,500 away. But they should remember that this was not all. They had expended £13,500 on the arc lighting in the borough, and had £1300 per annum interest and sinking fund to find. They had 20½ years, at £813, to find, which meant £16,600, or a little over £30,000 which they were asked by Mr. Price to throw away. He (Alderman Miller) once prophesied that if they adopted electric lighting they would find it a grand success; and he said this had been the case. He would prophesy again; "Have patience; keep your electric light. If you could save £3500 a year by adopting gas, it would take you ten years to work it out; and I say that before that time has half passed away, you will have your arc light at that price, if it is possible, because we are rapidly increasing." What was their position? Taking the sinking fund up to the 29th of September, they had in hand upwards of £50,000 in the sinking and reserve funds and balances. This was one-sixth of the amount they had expended. To whom did this belong? To the ratepayers; it was part of their heritage, and it would continue to increase if they would only allow it to do so.

At this point the question was further adjourned.

GAS AFFAIRS IN NEW YORK CITY.

The New Pressure Regulations.

Readers will doubtless remember that in the early months of the year New York was in the throes of an exhaustive inquiry into the gas supply of the city. The result was the passing of what is known as the Stevens Act (Mr. F. C. Stevens having been President of the Committee of Investigation), which came into operation on the 1st of July. It enacted (*inter alia*) that the maximum pressure at which gas should be supplied was 2½ inches. The effect of the change is well described in a communication which we have received from a correspondent in the city.

Scores of complaints are being made daily by gas consumers because of the lack of supply of gas, which is attributable to low pressure. The remarkable increase in this character of complaint is shown by the fact that, whereas the Gas Companies in Manhattan had during August, 1904, only 7223 complaints, last month [August] the complaints on this score had increased to 11,426. During the first ten days of the present month [September], the complaints amounted to 4177, compared with 2561 for the first ten days in September, 1904. In some sections of New York City, the densely populated portions particularly, the gas consumers have reported that the unsatisfactory gas supply has necessitated the use of candles and lamps in apartments and private houses; and in these districts complaint has been made to the various Gas Companies, by proprietors of small business places, that the lack of sufficient gas has necessitated the storekeepers closing at an earlier hour than usual. Hundreds of instances of this kind have been reported to the offices of the several Gas Companies by consumers who have been unable to understand why their supply of gas has apparently been so insufficient. These complaints have increased since the 1st of July, when the Stevens law went into effect, which provides that the pressure of illuminating gas in any service-mains in the city, at any distance from the place of manufacture, shall not be more than 2½ inches; and the minimum pressure 1 inch.

The fact is undenied by the Gas Companies that since this law came into operation, there have been some failures to comply with the strict provision of the Act regulating the maximum pressure of gas, which renders each of the violating Companies liable to a penalty of $1000 for each offence. Commissioner Oakley, of the Department of Water Supply, Gas, and Electricity, has had reports made to him by Dr. E. G. Love, who has charge of gas inspections, in which he has cited that the Mutual, New Amsterdam, Standard, and Consolidated Gas Companies have been shown to have violated the maximum limit of pressure. As no inspection is known to have been made in the Boroughs of Brooklyn, Queens, and Richmond, the conditions prevailing in these parts of the

greater city have not yet been made public. Commissioner Oakley has submitted the matter to Corporation Counsel John Delany, who will probably bring actions against the various Companies to recover the amount of the penalties prescribed by law.

The Stevens Act was placed on the statute-books against the advice, and under the protest, of those who were thoroughly conversant with the manufacture and distribution of gas; for in no other State of the Union are gas companies under any restrictions so far as maximum pressure is concerned. During the hearing before Mayor M'Clellan, and subsequently before Governor Higgins, evidence was submitted showing the impracticability of conforming to a law prohibiting a pressure of more than 2½ inches. From the day the Stevens Act became operative, daily and hourly attempts have been made by the Companies in New York City to conform to the law, but without success. The increase in complaints, the resorting to candles and lamps, and the early closing of places of business, are all due to the efforts of the Companies to live up to the requirement of the statute.

Senator Stevens, the Chairman of the Investigating Committee, and the father of the law which now governs in New York City, and is causing so much trouble to the gas consumers, undoubtedly framed it on that under which the Washington (D.C.) Companies operate, with this exception—that in the district of Columbia no attempt has been made to place a limit upon the maximum pressure. In fact, tests which have recently been made in Washington show that the pressure in the mains there runs as high as 3 inches.

As early as last June, or a month before the Stevens Act came into force, the Gas Companies did all in their power to adapt themselves to the new law, and determined to conform to it as nearly as possible without danger to the community. In order to do this, 312 men were employed continuously during 24 hours, and in various parts of the city, and 9768 tests were made, to ascertain the amount of pressure at the points where the men were stationed. This work was kept up several days, with the result that it demonstrated beyond all question of doubt that the maximum pressure of 2½ inches was not practicable, and could not be adhered to. The tests made last June, as well as those which are constantly being made now in the endeavour to conform, as rigidly as may be possible, to the requirements of the law, confirm the opinion given by Dr. A. C. Humphreys, the President of the Stevens Institute of Technology, last May, to the effect that no company could comply with the provisions of the proposed law, and that complaints as to "poor gas" were nearly always attributable to lack of pressure.

Under the law which created the State Commission of Gas and Electricity, the difficulties which are now besetting the Gas Companies in New York City may be met by similar companies in the State, as Commissioners Gunnison, Davies, and Shedden are given authority to fix the standard of illuminating power and purity of gas manufactured, and to establish a standard of pressure at which it shall be delivered, where such standard is not otherwise prescribed by law.

Mr. W. H. Bradley, the Chief Engineer of the Consolidated Gas Company of New York, speaking recently of the non-conformity to the law by the Gas Companies of the city, made the following remarks:—

> There is no question but that we are unintentionally unable to conform with the maximum requirements of the Stevens law. That we are doing so is not because we are tempted to defy the law, but for the simple reason that to conform to it is an absolute impossibility. In no other State in the Union is there a law that fixes the maximum pressure. The question of gas pressure in this and other large cities is the simple one of demand and supply; and within reasonable limits it is capable of regulation. The narrow margin allowed by the Stevens Act—that is, a minimum pressure of 1 inch and a maximum pressure of 2½ inches—renders a strict compliance with the law absolutely impossible.
>
> I testified before the Stevens Committee, from a knowledge gained by forty years' experience in the gas business, that it would be impossible to maintain a uniform pressure in the gas-mains under the streets of New York, and that I believed it to be impossible in any city. Since giving that testimony, I have facts and figures which prove that my conclusions were right. After the passing of the Stevens Act, I began exhaustive investigations with the view of determining how nearly it would be possible to comply with the law by adjusting and readjusting pressure; and in some instances I caused additional pieces of main to be laid where practicable, to ensure a sufficient supply. The pressure on the mains varies almost momentarily, as shown by the gauges at the places whence the gas is distributed, while the pressure at the works remains constant.
>
> This question of pressure is one that we are constantly watching; and to arrive at a means of keeping within the law, if possible, we now have a small army of men constantly on the watch at testing-stations scattered throughout the Manhattan and Bronx boroughs. I do not know of any apparatus that will make the pressure uniform over a system of mains. I have never seen one, and have never been able to find any that was applicable. I have never received an order from anyone connected with the Consolidated Gas Company to increase the pressure in the streets for the purpose of burning, or inducing or forcing the consumers to burn, more gas; and I have never given an order myself in any case of the kind, with that purpose in view. In all my forty years' experience in the business, I have never maintained any pressure in excess of that necessary to the efficient operation of the system, and to the advantage of consumers.

Interest on Consumers' Deposits.

The correspondent who sent the preceding notes forwarded with them some particulars in regard to the operation of the deposit system in New York. There are something like 600,000 gas consumers, and a very large proportion of this number have deposits with the various Companies, who allow upon them interest at the rate of 6 per cent. per annum. A few weeks ago, the Consolidated Gas Company cleared off many of these accounts, and returned to the consumers the original deposits with the accumulated interest. Out of some thousands of cases, our correspondent selected the following:—

Original Deposit.	Interest.	Total.	Original Deposit.	Interest.	Total.
$8 ..	$13·63 ..	$21·60	$15 ..	$22·50 ..	$37·50
10 ..	18·80 ..	28·80	15 ..	23·00 ..	38·00
10 ..	20·30 ..	30·30	15 ..	28·55 ..	43·55
10 ..	20·80 ..	38·80	20 ..	33·60 ..	53·60
10 ..	22·05 ..	32·05	20 ..	42·60 ..	62·60

It will thus be seen that the original deposit was returned to the consumer considerably augmented; and our correspondent says that in some instances it was increased threefold.

The Gas and Electricity Commission at Work.

The first meeting of the above-named Commission, which, as already mentioned, was constituted by the Stevens Act, was held on the 22nd ult.; two of the Commissioners (Messrs. Gunnison and Davies) and the Acting-Secretary (Mr. Hoxsey) being present. Among the business which came up for consideration was an application by the Brooklyn Borough Gas Company, who operate in Coney Island and what was the old town of Gravesend, and is now the 31st Ward of Brooklyn, for permission to issue $1,000,000 worth of bonds—$500,000 to take up an old issue of the same amount, and $500,000 for improvements of various kinds. Mr. W. N. Dykman, the Counsel for the Brooklyn Union Gas Company, while not specifically opposing the application, tried to get a stipulation that the money obtained by the sale of the bonds should not be used to extend the mains of the Borough Company into the territory occupied by the Union Company. It was finally agreed that the order would specify the exact purposes for which the bonds were to be issued, in case the Commission decided to grant the application.

LONDON COUNTY COUNCIL AND GAS SUPPLY.

The Legislation of the Past Session.

At the Meeting of the London County Council to-day, the Parliamentary Committee will present their report on the work of the past session, in which, as our readers are aware, the question of the gas supply of the Metropolis figured conspicuously.

Acting upon the instructions of the Council, the Committee prepared and submitted to Parliament eight Private Bills, one of which was the London Gas Bill. Four of them passed, with material alterations in some cases, and the rest failed. In addition, the Committee examined 45 Private Bills (among them being those of the Gas Companies) and a Provisional Order; and they also had under consideration 52 Public Bills. There were in all 112 Bills requiring to be watched or opposed. With regard to the Bills promoted by the Gas Companies, which, the Committee say, "sought to give effect to certain of the recommendations of the Departmental Committee on Gas Testing, while neglecting others less favourable to them," they were, it is stated, "successfully opposed, and the Council's own Bill, which proposed to carry out the recommendations almost in their entirety, passed into law with some modifications."

The Committee give, as usual, details of the results arrived at in regard to the various Bills. Taking their own first, they say: "The Bill as passed embodies the whole of the proposals put forward by the Council in their Bill of the previous session, which were: (*a*) To allow the Chief Gas Examiner to decide an appeal in the absence of parties who did not attend before him after due notice; (*b*) to require the Company and the Chief Gas Examiner to give the Council notice should an appeal which had been lodged be withdrawn; (*c*) to prescribe the times within which proceedings for breaches of the Company's Special Acts might be taken. The Select Committee of the House of Commons, after four days' discussion, passed the preamble of the Council's Bill and rejected that of the Companies. The points on which the Council's Bill was modified were: (1) The question of reducing the standard price of [*sic*] a penny; (2) the suspension of the forfeitures in respect of sulphur impurity; (3) the testing for illuminating power in a case of deficiency was altered so as to be, as the purity test now is, taken on an average of three days instead of one day as at present. With regard to the first point, it was thought well to strike out the clause, as Counsel thought there was no real support in the report of the Departmental Committee; and this was done. On the second point, the Committee decided to follow the report, and abolish the sulphur test for forfeitures. On the third point, the Chairman suggested that the illuminating power should be tested in the same way as the purity is at present—viz., on a three-day average; and a provision to this effect was inserted, but with the test the Council sought to introduce, and regarded as the most important part of the Bill—namely, testing at 5 cubic feet per hour flow. The Committee also inserted the clause for which the Council asked, rendering the Companies liable to a penalty of £50 a day in the event of their disregarding various provisions of their Acts which it has hitherto been found most difficult to enforce. The Select Committee of the House of Lords, after hearing evidence from the Gas Referees, thought that the method of testing should be left to the existing law; but eventually a clause was agreed with the Companies by which the Gas Referees are to prescribe from time to time the burner and chimney suitable for testing the various gases when consumed at the rate of 5 cubic feet an hour, and the burner is to be practicable for use by the consumer. The three-day average for illuminating power tests was retained; but if the gas supplied by a company is more than a candle below what it ought to be, that day's test is not to be counted in the average. The Bill also contains power for tests to be made for purposes of ascertaining (1) the calorific power, (2) the purity as regards sulphur other than sulphuretted hydrogen, and (3) the illuminating power by means of a flat-flame burner. These tests were recommended by the Departmental Committee on Gas Testing, and do not carry forfeitures. A new test for sulphuretted hydrogen is to be prescribed by the Gas Referees, as recommended by the Departmental Committee."

Dealing with the Bills which required to be watched, opposed, or amended, the Committee refer to those promoted by the Gaslight and Coke, South Metropolitan, and Commercial Companies in combination, and by the South Metropolitan and South Suburban Gas Companies on their own account. As to the first-named Bill, they report that "after considerable discussion it was rejected," and the Council's

Bill passed, as already stated. With regard to the South Metropolitan Company's Bill, the Committee state that the Select Committee of the House of Commons rejected Part II., which sought to abolish the office of Gas Referees, and to make statutory the tests for the gas of the three Companies; while in Part III. a clause applying the London Building Acts was acceded to by the Company, and the Bill was passed. As to the South Suburban Gas Company's Bill, the Committee report that when it was before the Select Committee of the House of Commons the Company withdrew their proposal for a reduction of illuminating power from 15 to 13 candles, and the alteration of the testing provisions. The abolition of forfeitures for sulphur impurities was allowed; and a proposal to allow a margin of half-a-candle deficiency in illuminating power before any penalty was incurred was, on the Council's opposition, refused by the Committee. The Bill was passed.

GAS-METER TESTING IN LONDON.

The Testing of Indices.

The recently issued report of the Public Control Committee of the London County Council for the year 1904-5, which contains the report of the Chief Officer of the Department (Mr. Alfred Spencer), gives particulars in regard to the testing of gas-meters in the districts under the jurisdiction of the Council. There are now four meter-testing offices—at St. Ann's Street, Westminster; Rosebery Avenue, Clerkenwell; White Lion Street, Spitalfields; and Avonmouth Street, Newington. Up to 1898, the Council had only three offices; but with the advent of the prepayment system of gas supply the number of meters submitted for testing increased enormously, and it became necessary to greatly extend the accommodation and facilities for the work. With this object the Council built an additional office at Clerkenwell, replaced the old Southwark office by a large one at Newington, and have now greatly improved the one at Westminster.

The growth of the work and the fees received will be appreciated from the following figures: In 1864, the number of meters tested was 31,186, and the amount of fees received, £1026 13s.; in 1868, the figures were 55,576 and £1862 19s.; in 1888, they were 73,080 and £2670 2s. 6d.; in 1898, they were 204,216 and £6468 16s.; and in 1900, they were 211,392 and £6724 14s. The next years witnessed a drop; but in 1904-5 the number of meters was 229,145, and the amount of fees received was £6993, compared with 198,604 and £6072 in 1903-4—an increase of 30,541 in the number of meters tested and of £921 in the fees received. The following table shows the number of meters tested and fees received at each of the Council's offices during the twelve months covered by the report:—

	Westminster.	Clerkenwell.	Spitalfields.	Newington.	Total.
Meters received—					
Wet . . .	177	740	33	3,687	4,637
Dry . . .	67,101	44,773	47,467	65,167	224,508
Meters stamped	61,816	41,568	41,424	51,749	196,557
,, rejected	5,462	3,945	6,076	17,105	32,588
Fees received .	£1,953	£1,346	£1,389	£2,305	£6,993

Mr. Spencer points out that the Sale of Gas Act, 1859, regulating gas-meter testing, is "somewhat unsatisfactory, as the rules laid down for testing cannot be strictly applied to all gas-meters, and there is no provision for the testing of indices." He goes on to say: "Shortly after the Act was passed, attempts were made to remedy these defects; and in 1860 amending Bills were introduced, and were considered by a Select Committee of the House of Commons. The Committee finally adopted one of the Bills, and reprinted it with their amendments. The revised Bill contained new rules for testing meters, and included provision for the verification of indices. The Bill was not, however, brought up in time to be dealt with that session, and was never again revived. Several attempts were made by the late Metropolitan Board of Works to induce the Board of Trade to take up the matter, but without success, although the absence of any provision for the testing of indices is a serious omission, as under the present law it is quite possible for an inspector to stamp a meter as correct while its index registers incorrectly through some defect in the gear. Until the law requires meters to be so constructed as to permit of the index being taken out and examined, it will be impossible to properly test indices. The Council's inspectors, however, are instructed to do all they can to detect inaccuracies in registration; but it is practicable to examine, and even then very imperfectly, only the indices of disputed meters, and of meters for 10 lights and upwards, and these number less than one-third of the total number submitted for examination. During the past year, 12 incorrect indices have been discovered; the amount of error ranging from 50 per cent. in favour of the consumer to 150 per cent. in favour of the gas company." Mr. Spencer adds that the Public Control Committee are now considering in what respects the provisions of the Act are inapplicable to the requirements of modern gas-meter testing, and what steps can be taken to procure its amendment.

Brixham Public Lighting.—At a special meeting of the Brixham Urban District Council on Monday last week, the Council in Committee reported that the Board of Trade would not allow Messrs. Edmundson's Electricity Corporation to bring high-tension cables along the road from Kingswear; and consequently the Corporation regretted their inability to carry out their scheme for the public lighting of Brixham by electricity, the tender of £500 for which was accepted at the September meeting of the Committee. The Brixham Gas Company offered to provide 200 No. 4 Kern burners, and undertake the public lighting for ten months' service over five years, for the annual sum of £400—a difference of £160 per annum on their original tender. It was resolved to accept their offer, and also to support the application of the Company for a supplementary Act to enable them to lay down plant and undertake the supply of electricity for lighting and motive power purposes in Brixham, subject to certain agreements being sanctioned.

EXPLOSION IN A SULPHATE HOUSE.

Details as to an explosion of a sulphate still at the Faversham Gas-Works, which occurred last November (as briefly recorded in the "JOURNAL" for Dec. 13, p. 866), are given in a Board of Trade report recently issued. As the remarks of the Inspector who was sent down by the Board to inquire into the accident are important, as indicating a possible source of trouble at other works, we give some extracts from the document, as issued by the King's Printers.

The Board of Trade Surveyor who conducted the investigation (Mr. Henry F. Kidd) says the explosion occurred about 5.15 p.m. on Wednesday, Nov. 30, and resulted in the death from severe scalds of one man, named Reginald Osborne, and injury to another man, Thomas Adsley. The sulphate still was a cylindrical cast-iron vessel, about 18 feet high, and 2 ft. 6 in. internal diameter. It was made up of two pieces, each 1 inch thick; the shorter piece, about 6 ft. 6 in. long, rested in a socket on the cast-iron base; the longer piece, about 12 feet long, was fitted into a socket on the top of the shorter one. The sockets were about 4 inches deep, and filled in with lead. The cover was of cast-iron, similarly secured. Inside, three angle irons were fitted to support wooden trays on which coke rested. With the exception of a space of about 18 inches at the bottom, and one of about 12 inches at the top, the still was filled with coke. The mountings were as follows: One glass liquor-guage, one 1½-inch inlet for the liquor and gas from the heater, one 2-inch inlet for the gas from the liming boilers, one 1¼-inch outlet for the liquor to the liming boilers, one 3-inch outlet for the gas to the saturator, and two manholes (one on the top 16 in. by 12 in., the other on the side at the bottom 11 in. by 9 in.). The still, which was about eighteen months old, was lagged externally.

It seems that the excessive pressure in the still caused the cylindrical part to be lifted bodily from the base, the latter being broken into eight pieces, one of which was blown about ten feet away. The body of the still at the bottom was cracked in three places. The internal trays and coke were blown out, and all the external fittings already mentioned were broken off. In falling, the still broke the roof of the building, and striking the top of the heater, came to rest as shown in reproduced sketch.

The explosion, in Mr. Kidd's opinion, was caused by the steam in the liming-boiler being allowed to rise to a higher pressure than was safe to be admitted into the still. Owing to an attendant having closed the cocks leading to the glass liquor-gauge and the mercury pressure-gauge on the liming-boiler, it was impossible to know what pressure of steam was being admitted.

In the course of his general remarks, the Surveyor says: The ammonia gas or sulphate plant, of which the still formed a part, was erected in May, 1903, as an addition to the Faversham Gas-Works. The process of working is as follows: The crude ammoniacal liquor is pumped into an overhead tank; and from there it gravitates to the heater (shown), where it is raised to the boiling point by the waste gases from the saturator. The hot liquor and ammoniacal gas leave the heater and pass into the top of the still, which contains ordinary gas coke supported on a series of three trays. The liquor and gas being brought into contact with the coke, causes mechanical separation of the free ammonia gas. The liquor then passes to the bottom of the still, and is conveyed to one of the liming-boilers, one only of which is supplied with the liquor at a time. There it is mixed with cream-of-lime and heated to a boiling temperature by steam, the admission of which is regulated by means of cocks on the top of the liming-boilers. The remaining ammonia is liberated by the boiling process, and passes to the bottom of the still, where (joining the free ammonia) the gas passes out at the top of the still, through a pipe to the bottom of the saturator, and is there bubbled through dilute sulphuric acid—the salt (sulphate of ammonia) being precipitated. The salt is taken out, laid on the draining table, and afterwards removed to the store. After the sulphate is formed, the waste gases pass out from the top of the saturator, through a pipe to the top of the heater, through the tubes, and out at the bottom of the heater, thence to the condensers and purifiers of the coal-gas plant. This is the cycle of operations.

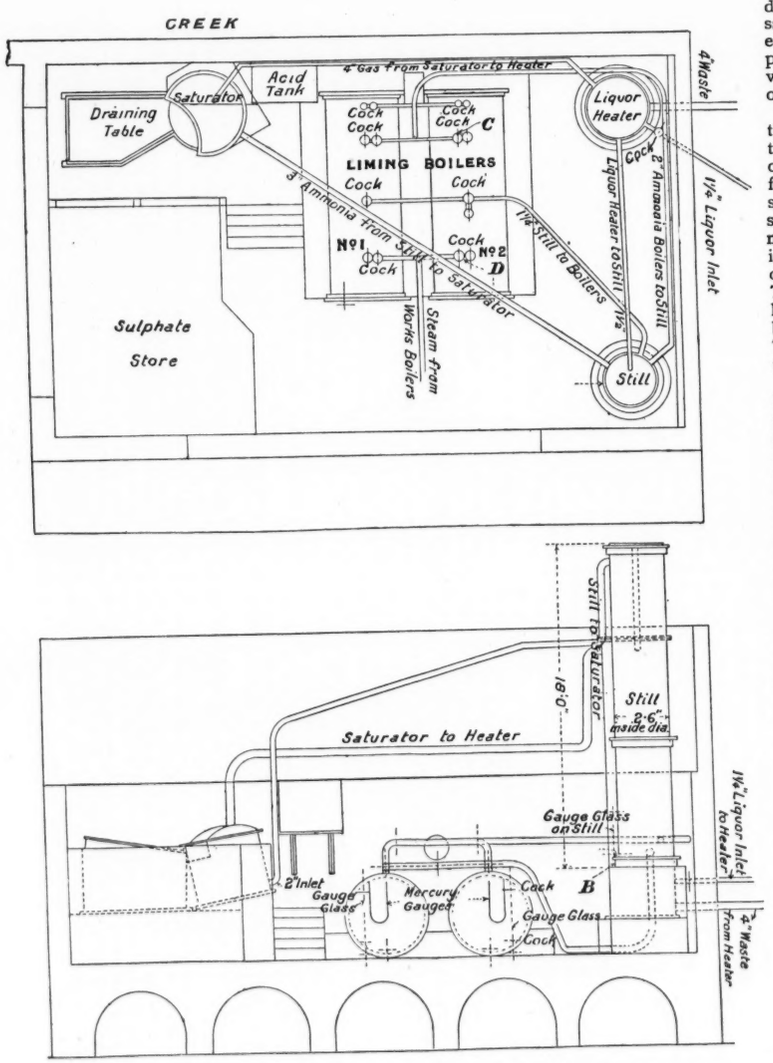
When the sulphate plant was erected, Mr. Arthur Easton, the Manager of the Faversham Gas-Works, engaged the chief operator of the sulphate plant at the Commercial Gas Company's works, London, to instruct William J. Palmer and Reginald Osborne (deceased) as to the working of the plant. Thomas Adsley was afterwards instructed by Osborne.

I was informed that soon after the plant was erected, a steam-gauge was fitted near the liming-boilers. The difference in the pressures registered on this gauge and the gauge on the works boiler, which is some distance away, was about 20 lbs.; the latter showing the higher pressure.

A pressure of steam of about 15 lbs. per square inch acting under the cover would be enough to take the weight of the still, including its lagging, and the coke it contained. The plant had not been worked for about six weeks prior to the explosion. At the time of the explosion Adsley was in charge of the sulphate plant, and was being assisted by Osborne to warm the apparatus by means of steam from one of the works boilers, of which there are two, loaded to a pressure of 100 lbs. per square inch. The pressure indicated on the steam pressure-gauge was about 82 lbs. per square inch at the time of the explosion. The steam passed from the works boiler by means of 1¼-inch piping through the liming-boiler No. 2, and thence to the bottom of the still. When I visited the works, I found the cocks to the glass liquor-gauge mountings on the liming-boiler shut off. A mercury pressure-gauge, regulated to blow at about 12 lbs. per square inch, is attached to the upper cock. This mercury gauge is the only safety outlet fitted on either of the liming-boilers.

The glass liquor-gauge cocks being shut off, there were no means of knowing the pressure in the liming-boiler at the time of the explosion. The steam-inlet cock D and the eduction cock C leading to the still were full open.

The 3-inch pipe from the top of the still to the saturator I found to



PLAN AND ELEVATION OF THE AMMONIA STILL AT THE FAVERSHAM GAS-WORKS.

be clear. This pipe is reduced to 2 inches diameter where it enters the bottom of the saturator. This was also clear, with the exception of some loose crystals of sulphate of ammonia, which, when water was poured down, did not impede the flow of water.

On starting the plant on the morning of the day of the explosion, it was found that the waste-gas pipe from the heater was choked. This was known by the steam from the still blowing out of the saturator; so that the pipe between the still and the saturator must then have been partly, if not wholly, clear. Tar deposit was found in this waste-gas pipe. The pipe was cleared, and the plant was started again. There had also been trouble with the liquor gauge-glasses; two or three had broken before one proved satisfactory. This would probably be the reason for the attendant shutting the gauge-cocks.

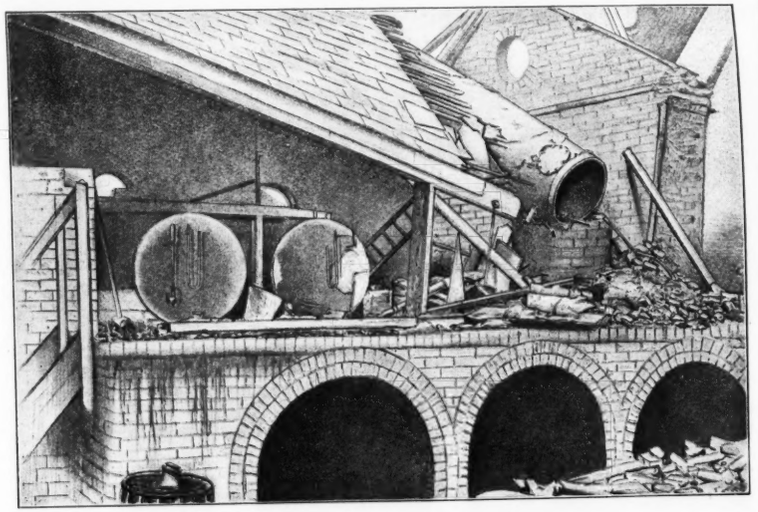
Palmer stated that about 4.45 p.m. on Nov. 30, half-an-hour before the explosion, he noticed that the cocks on the glass liquor-gauge mountings were shut off. He called Adsley's attention to the matter, and they were opened. The mercury gauge on No. 2 liming-boiler then indicated 7 lbs. pressure. If the pressure rose to 8 lbs. the attendant was instructed to close the steam-cock D. He also stated that the heater was warm at the time. This would show that steam was passing through the tubes of the heater and warming the internal liquor.

Adsley admits that after Palmer had left, the liquor-gauge cocks were shut again; but whether Osborne shut them himself, or told him to do so, he could not remember. He also stated that the steam-cock D was opened about half-way. After the explosion, however, this cock was found to be full open. Mr. Easton assured me that, as far as he knew, nothing had been disturbed about the plant since the explosion, prior to my visit.

A slight leak was noticed in the vertical seam of the heater. Adsley went to get a ladder. This proved to be too short. He then brought a longer one, placed it against the heater, and mounted the ladder to examine the part that was leaking. Osborne handed him a lighted candle. At this moment he heard an explosion; the report coming from the bottom of the still. He was knocked off the ladder by the force of the explosion. Osborne was afterwards found lying beside No. 2 liming-boiler.

William Palmer, sen., foreman of the works and father of William J. Palmer, was walking towards the sulphate plant when the explosion occurred. He, with great promptitude, ran to the works boiler and shut off the connection leading to the sulphate plant; and he afterwards shut the waste-gas valve.

I can only account for the explosion by the fact that the comparatively high-pressure steam entering the still did not free itself through the outlet pipes quick enough to reduce its pressure to a safe limit; the result being that the cylindrical part of the still was lifted clear of the base. Mr. Easton stated that he had intended having an internal examination of the still in the summer, when it would then have been about two years old. He will have a steam-reducing valve fitted between the works boiler and the liming-boilers; also fit additional mercury-gauges direct to the shell of the liming-boilers, of a larger bore than the present ones, which are $\frac{3}{8}$ inch diameter.



VIEW OF THE PLANT AFTER THE EXPLOSION.
[Reproduced from a Drawing in the Inspector's Report.]

In his "observations" at the close of the report, the Engineer Surveyor-in-Chief (Mr. Peter Samson) says: This explosion was clearly due to over-pressure, owing, it is thought, to the steam in one of the liming-boilers having been allowed to rise to an abnormally high pressure. The still and heater were both in open communication with this vessel, and the pressure appears to have been sufficiently high to lift the body of the still out of its seating. Crystals of sulphate of ammonia were found in the outlet pipe which conveyed the ammonia gas from the still to the saturator. It is, therefore, probable that this pipe may have been, in a measure, obstructed, and so caused an augmentation of the pressure in the still and heater. But had this pipe been quite clear, it is more than probable that, under the conditions described in the report, sufficient steam was passing from the liming-boiler to the still to lift the latter and thereby cause the explosion. It would also appear from the fact that the longitudinal seam of the heater was leaking just before the explosion occurred, that the pressure in this vessel was higher than that to which it and the still were usually subjected. In order to prevent a repetition of such a mishap, a suitable safety valve should be fitted in the steam-pipe between the main boilers and the liming-boilers, in addition to the reducing-valve referred to in the Surveyor's report—both valves being adjusted to the pressure required in the liming-boilers.

Summons Granted Against a Gas Manager.—At Caerphilly, some days ago, Mr. C. S. Goodfellow applied, on behalf of Mr. John Payne, of Caerphilly, for a summons against Mr A. R Cawley, the Manager of the Rhymney and Aber Valleys Gas and Water Company, for alleged threats. Mr. Goodfellow stated that the charge arose out of proceedings which were heard at that Court some time ago (see "JOURNAL" for May 30, p. 595). The application was granted.

THE EXPLOSION AT THE LONGRIDGE GAS-WORKS.

Disastrous Results of a Choked Pipe.

The inquiry into the circumstances attending the deaths of John Ormerod and William Bamber, as the result of the explosion which took place at the Longridge Gas-Works on the 20th ult., as already recorded in the "JOURNAL" (*ante*, p. 50), was resumed on Monday of last week by Mr. Robinson. Mr. Herbert Porter, one of the District Inspectors under the Alkali Works Regulation Acts, and Mr. J. Law, an Inspector of Factories, were present. Mr. R. Ascroft watched the proceedings on behalf of the Gas Company; and Mr. Wilson represented the injured Manager (Mr. H. Lancaster).

George Houghton, a stoker at the gas-works, stated that he attended to the fire which was directly underneath the exploded boiler about nine o'clock on the night prior to the accident, and when he went off duty at six o'clock the following morning, he told Bamber to fire up again about seven o'clock. So far as he knew, the boiler was not fitted either with a safety valve or a steam-gauge; and the only intimation he had that there was sufficient steam up was when the vitriol in the saturator of the sulphate plant began to boil. In reply to Mr. Wilson, he admitted that before Mr. Lancaster retired to bed at one o'clock in the morning he told him to call him if the liquid commenced to boil; but it did not.

A gas maker and fitter named Samuel Smith stated that up to about the month of November, 1902, he was employed at the Longridge Gas-Works, and had charge of the ammonia still, which was put in in 1900. The boiler was then a good, strong second-hand one, though he did not know that it was tested before being put in. There was no safety-valve attached to it; but there was a safety-pipe which allowed the water to bubble out when there was too much steam. When he was at the works, he took the precaution of always making the pipe air-tight after he had used it. In this way, he was able to prevent corrosion. Replying to Mr. Ascroft, witness said that he thought the boiler was quite strong enough for the purpose for which it was used. Questioned by a juryman, he said he was not afraid of the still when he was engaged in working it, but of the gases which were generated.

A retort-setter named Walter Maskrey deposed that, at the instance of the Board of Trade Inspector, he sawed the lead pipe connecting the still with the saturator, and found it choked up with hard ammonia. Mr. Law said he and the Inspector came to the conclusion that this was the cause of the accident.

The Coroner characterized the safety-pipe as a crude sort of thing, and said it was just as liable to choke up as the other pipe.

The Jury returned a verdict of "Accidental death," adding a rider that, in their opinion, sufficient care had not been taken to see that the steam outlets were kept from corroding, and also that there ought to be some arrangement to show the pressure.

STOURBRIDGE GAS DEPARTMENT.

Mr. W. North's Resignation.

At the last Meeting of the Stourbridge Urban District Council, the Gas Committee reported that they had received a communication by letter from Mr. William North, the Engineer and Manager, expressing his desire to retire on March 31, 1906, and giving formal notice to this effect. The Committee notified the fact with regret.

The Chairman of the Committee (Mr. Fiddian) referring to the matter, said the Committee felt bound under the circumstances to recommend the Council to accept the resignation. Mr. North was not a young man now; and he felt he was entitled to a few years' rest, if his health permitted it. As a Committee, and as members of the Council, they were all very sorry to lose the services of Mr. North. They remembered very well that when the Council took over the gas-works the sum which they were asked to pay for the purchase came as a big surprise to the town; and they doubted very much whether they had done the right thing. Mr. North took over the management for them; and every year since then he had made the concern pay, and left something to the good. He thought they had every reason to be proud of the services which Mr. North had given to the town. The position was a very difficult one to take up at the time; and a good many people thought the Council would land themselves in a very unpleasant position. But Mr. North had pulled them through these difficulties; and the state of affairs was now a very promising one for the town. He suggested that the Council should give permission to the Committee to bring up a report as to the future salary to be offered for the position of Manager, and also as to whether it was necessary to alter any of the present positions of officials. If the Council would do this, it would simplify matters, for they did not want to lose any time. Mr. North had given six months' notice; but the Committee wanted permission to advertise as soon as possible, as the man whom they would like to appoint might be unable to get away for three or four months. Mr. North was to be congratulated on the present position of the works. His successor would have control of an enterprise second to none of its size in the kingdom. It was now in good working order; and the improvements which would be finished before Mr. North retired would leave the works in a very good state. He repeated that the Council would all regret to lose the services of Mr. North (hear, hear); for he had proved a very able man in connection with the town's gas service.

The Chairman of the Council (Mr. J. E. Jones) having supported all Mr. Fiddian had said regarding Mr. North's work, and stated that at a later date he would take care there was placed on the minutes a record of the faithful services which he had rendered to the town in its Gas Department, the resignation was accepted. A resolution was then passed requesting the Committee to consider the position which had been created by the resignation of Mr. North, and to report as soon as possible upon the terms upon which a successor should be appointed, and any re-adjustment of the staff at the gas-works which might be thought necessary under the altered circumstances.

DEVONPORT CORPORATION GAS UNDERTAKING.

Shortage in the Stock of Coal.

The report presented to the Devonport Town Council by the Gas Committee last Thursday stated that the Gas Engineer (Mr. J. W. Buckley) had cleared out the coal-stores, and found a deficiency of 611 tons in the stock, as shown in the carbonizing-book. The Committee had decided that the amount of the coal in question should be written off. In view of the early completion of the carburetted water-gas plant, a tender was accepted for 77,000 gallons of oil, at 3⅜d. per gallon, and it was decided to lay an oil pipe-line from Pottery Quay to the gas-works. Messrs. Willey and Co.'s tender of £499 5s. was accepted for the pipes; and the Engineer was authorized to carry out the excavations and the reinstatement of the road, at an estimated cost of £200. It was decided that consumers' incandescent burners should be cleaned, and flat-flame burners supplied free of cost, and also that service-pipes should be provided and laid without charge.

Moving the adoption of the report, the Chairman of the Committee (Alderman Hornbrook) stated that the deficiency in the stock of coals was a very delicate matter, and he did not care to say much about it. Some of the members pressed for an explanation, and asked whether the coal was weighed when taken into the works, or the ship's bill of lading accepted. Mr. R. H. Rendle asked whether stock was taken before the former Manager left, and said it was un-English to raise the question now behind his back. Alderman W. Littleton said the Committee had gone thoroughly into the matter, and the Borough Accountant had examined the books for a considerable period, to endeavour to ascertain where the shortage arose. A deficiency had been going on for nearly twenty years. There had been no real stocktaking, and it was well known that deterioration took place in coal kept for a long time. The feeling of the Committee was that the deficiency should be written off, and a fresh start made. Mr. Buckley, replying to the Mayor, said that when he took over the management he made careful measurements of the coal, and found that there was 611 tons less than the quantity shown to be in stock. The Town Clerk remarked that Mr. Buckley's figures were only an estimate, and asked if he suggested that someone had run away with the coal, Mr. Buckley said he did not. The coal had from time to time been used, and had not been accounted for. Possibly this had not been done intentionally. The Town Clerk: You do not say the Corporation have been defrauded? Mr. Buckley: Not in the slightest. Mr. Waycott: The coals used have been under-estimated? Mr. Buckley: That may be so. The coals have been used.

The matter then dropped, and the report was adopted.

PRICE OF GAS TO MANUFACTURERS IN BIRMINGHAM.

It is stated that the matter of the price of gas for manufacturing purposes was informally discussed by the Birmingham Gas Committee last week, and that figures which have been laid before them by the Secretary (Mr. G. Hampton Barber) will be considered in due course. The "Birmingham Post" remarks that "the question of suction gas is by no means a new one to the Committee, for they have had it under consideration for some time. It was this that influenced them in July last in reducing the price of gas for power—a reduction which took effect at the September quarterly reading of the meters. It was accomplished by putting all the charges for gas-engine purposes upon the lowest scale of prices—a method which forms a precedent so far as the department are concerned, inasmuch as hitherto the Committee have always regulated their charges by the quantity consumed, and have paid no regard to the purpose for which the gas was used. By adopting the new method, the trade of the city was recognized; and a great many of the smaller manufacturers who had previously paid from 2s. to 2s. 6d. per 1000 cubic feet, have now received a concession by the reduction of the price to 1s. 10d. per 1000 cubic feet. This has had the effect of placing the whole of the manufacturers in the city upon the same level in respect to power gas."

Mr. J. J. B. Arter, the Chairman of the James Cycle Company, whose remarks regarding the charge made for gas by the Birmingham Corporation were reproduced in last week's "JOURNAL," has returned to the subject by means of the following letter in the local Press.

From the ratepayers' point of view, I should like to call attention to the effect of the past policy of the Gas Committee upon the profit-earning capacity of the gas undertaking, and to show what will consequently be the result of continuing on the same lines. With a monopoly of a daily necessity—such as water—the concern controlling it can govern the prices and other conditions of supply without interference, and prosperity, though not attained by the most economical direction, would not be readily destroyed without gross mismanagement. This applied until recently to the city gas supply; but I submit that conditions have now altered, and that we have already sustained loss, part of which could have been saved by accepting these conditions, with substantial concessions, to meet competition.

I have prepared from the gas accounts for the year ended March 31 last statements from which I draw some of my conclusions. The selling price paid per 1000 cubic feet on large consumers paying the minimum selling price is 1s. 9·00d., and on consumers paying the average selling price 2s. 1·52d. The cost of coal and other materials used for production, with direct productive wages and expenses thereon, is 8·51d. and 8·51d. respectively; and the contribution towards dead expenses and profit on selling price per 1000 cubic feet, 1s. 0·49d. and 1s. 5·01d. The loss of net profit to the Gas Department on every £1000 of sales lost through consumers adopting suction plant for power and electric light installations is for the same two classes £600 and £666. I wish to direct attention to the slight cost of coal and all other expenses of depositing same on works and productive wages thereon – 1·51d. per 1000 cubic feet of the selling price, as compared with 1s. 0·49d. for dead charges and profit contained in the minimum selling price of 1s. 9d. per 1000 cubic feet or, again, 1s. 5·01d. for dead charges and profit in the average selling price of 2s. 1·52d. In the former case, it means a loss of £600 net profit, and in the latter £666, in every £1000 of city gas superseded by suction gas. In the interests of our

city, it seems to me that means ought to be found to restore confidence in the city gas without waiting until many suction-gas plants have been installed. It is to an extent immaterial whether they are so much superior to city gas or otherwise, if the makers of them have succeeded in convincing the public that the advantages are real. It must not be overlooked that the damage does not lie in their use for driving power alone. They will be largely used for electric light installations. Attempts are also being made to produce a semi-purified gas, suitable for brazing and enamelling.

It seems to me there are in the main two courses open to the Gas Committee, from which, as a sequence, certain broad results are to be expected—either to maintain the price of gas, thereby forcing large consumers for power, electric lighting, or manufacturing processes to instal gas plants; or to reduce the price of gas to consumers according to the quantity per quarter consumed, absolutely regardless of the use they make of it, and in fixing the scale of prices make substantial reductions at the point where gas plants commence to compete. I would remark that should the first course be pursued, large numbers of gas plants will be installed, notwithstanding the assertion that they are as costly to work. The manufacturing and distribution plant will not be so fully employed; and numbers of large meters and services will be disused. Contribution to the rates through gas profits would cease in proportion to the gas superseded through use of gas plants; and should the output of gas be reduced 5 per cent. (315,000,000 cubic feet) through the installation of gas plants, the percentage of dead expenses would increase proportionately, and it would mean a loss of net profit of £22,325, with the expenses continued at the present level. The alternate course would be calculated to keep the entire plant fully employed; and notwithstanding the slightly higher price over suction gas, it would make city gas preferable having regard to convenience, reliability, saving of outlay on plant and on gas for other purposes, and big consumers would still continue to contribute largely towards the reduction of rates through the gas profits. Should all consumers of 250,000 cubic feet and over per quarter be reduced from 2s. and 1s. 10d. to 1s. 6d. net, and the output increase 2½ per cent. as a sequel, the result would be a loss of net profit of £23,046, against £22,325, as mentioned above, on 5 per cent. reduction of output with prices maintained at their present level. I am supported in the price 1s. 6d. per 1000 cubic feet which I have taken for sale of gas by many capable gas engineers. I have taken gas for all purposes at the same price; and this must tell heavily against suction gas, because it is a greater concession than reducing the price for manufacturing purposes only.

The point at which reductions of price are conceded to consumers is intended to be that at which it would not pay to put in suction plant, because the saving would be too small. Gas is particularly affected by output on account of the heavy irreducible amount of dead charges, and extraordinary results can be attained by large output; and unless suction gas can be practically produced for nothing after the first outlay, I am sure that our gas will beat it out of the market if a liberal, broad, business-like policy is adopted.

Previous to the publication of this letter, Mr. Hampton Barber had, through the same channel, repeated his invitation to manufacturers to confer with him before deciding to substitute producer gas for town gas on their works, and intimated that it was not his intention to enter into a newspaper controversy on the question. A reply to Mr. Arter's letter has, however, been made by Mr. Arthur Chamberlain, who writes as follows.

With much that he [Mr. Arter] says, we must all be in agreement; but to his suggestion that to consumers of 250,000 cubic feet of gas per quarter a price be fixed of 1s. 6d. per 1000 cubic feet, whether for power or light, there are, I think, objections. In the first place, it disregards the interests of the smaller manufacturers, men who have always formed a most important—if not "the" most important—element in the city's manufacturing life. In the second place, it proceeds on the assumption that the economies of suction gas appeal only, or chiefly, to large users of motive power; whereas they appeal equally to small users—that is, to manufacturers using from 10 to 50 horse power. Thirdly, it ignores the fact that, wherever a suction gas plant can be conveniently installed, any possible reduction in the cost of city gas would still leave it hopelessly too expensive. Mr. Arter's own figures show this. He gives the cost of city gas in coal and wages alone as 8½d. per 1000 cubic feet, and to this has to be added 1s. for other charges. The cost of suction gas capable of producing a corresponding horse power is only 6d.; and as the plant pays for itself in about twelve months, there is no depreciation or interest on outlay to add. It appears to me that it would be suicidal for the Gas Committee to attempt to meet such facts by a price reduction.

On the other hand, there is no present likelihood of suction gas being used for illumination purposes, nor for power purposes in cases where space is deficient, or when the services of a stoker are not available. The policy, therefore, that should be followed by the Gas Committee, as indicated by these and other circumstances, is to keep up the present price of gas, secure of the consumption for purposes for which no competitive gas is suitable, and to rely on the natural increase of that demand to fill up the losses occasioned by the substitution of suction gas for power purposes.

EXTENSIONS AT THE CARLISLE GAS-WORKS.

Local Government Board Inquiry.

Last Thursday, Colonel W. R. Slacke, R.E, one of the Inspectors of the Local Government Board, held an inquiry at the Town Hall, Carlisle, with regard to the application of the Corporation for sanction to borrow £14,270 for gas-works purposes. It was explained that this amount was made up of £3700 for buildings in connection with the carburetted water-gas plant, and £10,570 for various purposes—including new retorts, which cost £4000; a new roof for the retort-house, on which £288 had been expended; mains, which were set down at £3266; lamps, which were to cost £344; and meters, for which £2670 was required. The Assistant Town Clerk (Mr. Allerton) said that application was made in April, 1902, for leave to raise the £3700 for buildings; but it was found that the Corporation had then no power to borrow, and the matter was suspended. In 1904, the Corporation obtained an Act of Parliament in which they were granted further borrowing powers to the extent of £15,000; and then the application was renewed. The erection of buildings for the carburetted water-gas plant commenced in 1901; and they were completed in 1902. The Corporation did not apply for sanction to raise money to defray the cost of the carburetted water-gas plant, as they were under the impression that the Local Government Board would not grant leave to borrow for such purpose. There was a balance of £5000 to pay for the plant, and the Committee were providing the money out of the gas profits at the rate of £1000 a year. Mr. Coulthard (the Chairman of the Gas Committee) asked if there was any possibility of borrowing this money. The Inspector said he was not prepared to say that the Board would or would not allow the money expended on the plant to be borrowed. The way to get an answer to the question would be to apply to the Board for leave. Mr. Coulthard remarked that the carburetted water gas had been useful to the Corporation. If they had not introduced it, they would have had to spend probably £100,000 on new works. The Inspector said that if the Board were prepared to sanction the borrowing of money for the buildings, they might also be willing to sanction the raising of money to defray the cost of the plant, as the buildings could be of no use without the plant. The City Treasurer (Mr. J. Graham) remarked that, after what the Inspector had said, no doubt the Corporation would make application to borrow the money.

STREET REPAIRS AND BROKEN GAS-PIPES.

Serious Results Averted at Birmingham and Sheffield.

The steam-roller is stated to have, through the breaking of a gas-pipe, been the cause of what might have become a terrible tragedy at Aston early last week. While Corporation employees were engaged in repairing Clifford Street, the occupiers of two houses opposite which the roller was working noticed a smell of gas; and in the evening this became so strong that it was decided to send a post-card to the Gas Department. Ultimately, however, finding that it was possible to light a lamp without any serious consequences, the two families seemed to ignore the escape, and retired to bed. Shortly after midnight one of the women, Mrs. Leavesley, woke up feeling very unwell; and on getting out of bed, she was overcome, and fell to the floor. Her husband jumped up, threw open the window, and ran into the street for assistance. This was speedily forthcoming; and a constable returned, and assisted in conveying Mrs. Leavesley into the open air, where she soon recovered consciousness. The remaining members of the family were found to be suffering from sickness. Attention was then fortunately turned to the next house, and it was discovered that the occupants were all suffering from the effects of the gas. The occupier, Mr. Wynn, was discovered in a dazed condition; while his wife and two daughters were unconscious. The open air, however, soon restored them; but the timely aid of the police was in all probability the means of saving their lives. Needless to say, the Gas Department's men were soon on the scene and stopped the leak. On investigation, it became evident that the steam-roller was the cause of the trouble, as a service-pipe running from the main, which is on the opposite side of the street, had been snapped, and the gas had found its way through the soil, which was very loose at this point in the roadway, owing to the repairing operations in progress. The escape did not, however, reach the air until, following the piping, it got to the interior of the houses. The service-pipe was some 12 to 14 inches below the level of the street.

The sufferers in the Sheffield case were a man named Court and his wife and four children. Early last Tuesday morning, one of the children awoke with a stifling sensation; and on rousing her sister, the room was found to be full of gas. An alarm was promptly raised, and the whole family were got out into the street, happily before they had experienced any very serious effects. The Gas Company were communicated with by the police, and immediately sent workmen to the place. They discovered gas was escaping from a 3-inch main underneath the footway, and had penetrated into the cellar of the house in question, and so to the other rooms. The footpath has recently been re-flagged; and it is thought that, as the pipe was a good one, it must have been fractured in the operation.

SALE OF GAS APPLIANCES AT NOTTINGHAM.

The Ironmongers and the Gas Committee.

The General Secretary of the Ironmongers' Federated Association (Mr. R. H. Smith) has written to the "Ironmonger" on the above subject. In November last year, as reported in the "JOURNAL" at the time, the Association laid before the Committee certain trade proposals which they took into consideration, with the result that the following arrangements have been come to: (1) The Corporation will not let out on hire any gas-fires or gas-radiators. (2) Should the Corporation sell any gas-fires or gas-radiators at their depôt, they will not do so at less than a certain profit on gas. (3) The Corporation have arranged with the ironmongers, gas-fitters and plumbers who introduce customers to the depôt for the purpose of making a selection of appliances, to allow the tradesman so introducing a suitable commission (amount arranged) on such purchases. (4) The Committee confirmed the assurance given by the Town Clerk not to undertake any internal work beyond the meters. (5) The present system with regard to the department paying for the fixing of stoves is to be continued. (6) The Committee will also arrange for the supply of gas at a nominal cost to ironmongers for purely advertising purposes, if the latter reserve a portion of their premises in order to make a special show of gas appliances, each case under this heading to be specially arranged with the officials of the Gas Department.

Referring to the foregoing arrangements, Mr. Smith said: "The Gas Committee has met us in a generous spirit, and the Chairman and its members have recognized the fact that if the ironmongers and plumbers of Nottingham are to continue to be ratepayers of the town their trade as sellers of gas appliances must not be taken from them by unfair municipal trading. What our Association has done in Nottingham, where the gas undertaking is owned by the Corporation, and in Bournemouth, Hornsey, and Croydon, where it is owned by private Companies, can be accomplished elsewhere."

METROPOLITAN WATER BOARD.

Inspection of Works—Statistics of Supply.

The First Ordinary Meeting of the Board after the summer recess was held on Friday—Sir R. M. Beachcroft in the chair. The Works and Stores Committee recommended—"That an annual inspection of the principal works be made by the Board; that the estimates of £200 (for travelling expenses) and £50 (for refreshments) to be submitted by the Finance Committee in connection therewith be approved; and that the Committee be authorized to incur expenditure not exceeding these amounts in respect of travelling and refreshment expenses respectively of the members of the Board on the occasion of such annual inspection: provided that the expenditure on refreshments shall be limited to 3s. 6d. per member per day." The Chairman of the Committee (Mr. E. B. Barnard) having moved the adoption of the recommendation, amendments were proposed to omit all reference to refreshments and the limitation of the expenditure. They were, however, both lost. Statistics relating to the supply of water for the months of July and August were presented. During July the total average daily supply was 252,815,000 gallons, and the number of houses, &c., supplied was 1,031,822. The total estimated population was 6,726,864. The mean supply per head per day was 37·65 gallons; the figure for the corresponding month of last year being 39·74 gallons. There was in store in impounding reservoirs at the end of the month 6779 million gallons. There were 1823 new supplies connected, and 12,392 yards of new mains laid. The total average daily supply during August was 233,471,000 gallons, and the number of houses supplied was 1,033,732. The total estimated population was 6,736,896, and the mean supply per head per day amounted to 34·66 gallons, against 36·49 gallons in the corresponding month of last year. At the end of the month the quantity of water in store was 6343 million gallons. The new supplies numbered 1810, and the new mains laid down measured 12,355 yards.

THE WATER SUPPLY OF LIVERPOOL.

Work of the Year—Politics in the Council.

At the final meeting of the Liverpool Water Committee for the municipal year, some details regarding the operations of the great undertaking of which they have charge were given by the Chairman, Alderman Burgess, while replying to a vote of thanks for his services. He said that there were to-day within the compulsory limits of supply 2760 more water tenants than there were twelve months ago. The compulsory area contained a population of 880,000; and outside those limits they supplied in Chorley 27,700 people, while in other districts where the water was given in bulk there was a population of 165,000. Thus about 1,072,000 persons were now dependent upon the Corporation of Liverpool for their water supply. The total quantity of water supplied from their works during the twelve months had been 10,827½ million gallons, an increase of 343¼ million gallons as compared with the previous year. There had been a slight falling off in the quantity sold by meter for trade and manufacturing purposes; but some compensation was to be found in the fact that the shipping, on which the city of Liverpool mainly depended, had taken 221 million gallons, as against 216 million gallons, an increase of over 4 million gallons. The quantity of water sold in bulk along the Rivington and Vyrnwy aqueducts had been 782 million gallons, an increase of about 53 million gallons; and this was, of course, a source of considerable revenue.

Turning to the work done during the past year, Alderman Burgess said that rather more than 13 miles of new mains had been laid in and around Liverpool; while much had been done in the direction of improving and maintaining the works. Out of a total length of 2442 yards of the Marchnant tunnel, about 1180 yards had been driven; and the electrical energy generated by means of the water power at Lake Vyrnwy, which was completed during the year, had been utilized by the Engineer at the outlet end of the tunnel. To replace old cottages, which for sanitary reasons must be demolished on the Vyrnwy watershed, new cottages were being erected below the dam; and eventually he hoped the population, which, fortunately, was very scanty in the district, would be concentrated off the gathering ground. Tenders had been accepted for the construction of three new filter-beds at Oswestry; and the covering of a portion of the goit near Withnell had been commenced. This was an important improvement of the Rivington works. Very little remained to be done to complete the purchase of the Rivington watershed. He was convinced that the Corporation acted wisely in the bold policy adopted with regard to the acquisition of this property; and he was glad to be able to express the opinion that, except in one instance, the properties had been acquired on terms fair and satisfactory alike to the previous owners and to the community, for the protection of which it had been necessary to purchase them. To show the amicable manner in which generally they had been able to arrange these matters, he mentioned that out of 36 purchases made during the past year, 28 had been by agreement, while in only eight cases had it been found necessary to have the price fixed by arbitration or by juries. A considerable quantity of unclimbable fencing had been fixed by the Corporation on the borders of Lever Park He need hardly say that, much as they regretted the action of Parliament in permitting the park—which must always be a source of anxiety to the Committee, and possibly of danger to the purity of the water supply—the Committee would scrupulously carry out the obligations imposed upon them. He was glad to say that the periodical chemical analyses made by Professor Campbell Brown, and the daily bacteriological tests made by Professor Boyce, showed that the high standard of purity of the Liverpool water was maintained. It was with very great regret that it was felt by the Committee to be necessary to curtail the supply of water during the night at the end of August and the beginning of September; but this was unavoidable owing to the fact that the recent drought had left them with the Rivington reservoirs almost empty. The curtailment was much less than had been enforced under similar circumstances previously; and he sincerely hoped that it would be many years before any interruption in the supply was again necessary.

Alderman Burgess said he would like publicly to acknowledge the kindness of the Manchester Corporation, who agreed to supplement the supply temporarily from the Thirlmere aqueduct; and though happily it was not needful for them to avail themselves of this offer, it was right to record their sense of the friendly manner in which they were met by their Manchester neighbours. The straits in which they temporarily found themselves showed very clearly that the second pipe-line from Vyrnwy was not commenced a day too soon. He could not conclude without expressing his deep sense of the value of the services rendered to the city by the Engineer (Mr. J. Parry) and by every member of his staff. For the last two or three years their work had been exceptionally heavy; and he did not believe it would have been possible for any public body to have been better served than the Corporation of Liverpool had been by the officials of the Water Department.

A vote of thanks was subsequently accorded to the Deputy-Chairman, Mr. J. T. Wood, who in response said that of recent years the work of the Council had become more and more distasteful to him. So far as his views went, the work being so well done in the Committees, it appeared that the Council Chamber was now used as a mere debating ground for politicians, rather than for carrying out the honest work of the town. (Hear, hear.) He said this because it might be the last time that he would have the honour of sitting there as Vice-Chairman. He should like to continue his work on the Water Committee and the Asylums Board, in which he had been engaged now for sixteen or seventeen years; but he felt he was not quite at one with any party in the Council, which seemed to be fighting with the idea of how to fling away the ratepayers' money on the working men. It would not be pleasant to him to occupy the position of a one-man party; and therefore he had decided at an early date to send in his resignation as a member of the Corporation. He would regret very much severing his connection with the Committee.

Cheaper Gas for Lighting at Rochdale.

The Rochdale Gas and Electricity Committee have decided to recommend the Council to reduce the charge for gas used for lighting purposes by 2d. per 1000 cubic feet—from 2s. 10d. to 2s. 8d. This is a matter that has caused much discussion in the town during the last few months. It may be remembered that, at the July meeting of the Council, the Committee recommended that the price to lighting consumers should be lowered by 3d. per 1000 cubic feet; the charges for gas used for other purposes to be reduced by 3d. and 6d., according to the quantity taken. The concessions to power users were granted; but the Council declined to lower the charges for lighting, after hearing a statement by one of the members, that an expenditure of £8000 or £10,000 was necessitated by unexpected demands of the Mersey and Irwell Joint Committee, for which no provision was made in the estimates last May. The Council's action in declining to give relief to householders was, however, unfavourably regarded; and some reduction of the lighting charges seemed imperative. There was a suggestion made that further action should be deferred until the end of the financial year; but this did not meet with much favour. Calculating on the basis of last year's consumption, the reduction of 2d. per 1000 cubic feet now proposed will mean a loss of about £2700 in the revenue of the department. Taking the lowered price for gas used for power purposes also into consideration, the loss of revenue is estimated at £4300. Against this there may be set a saving of £500 or more on the coal contracts just let. The profits last year were £19,500. It is proposed that the reduced charges shall come into force with the New Year.

The "Primary Needs" of Louth.

Some little soreness has been caused in Louth by the remarks with which the Local Government Board accompanied their refusal to sanction the application of the Corporation for leave to borrow £17,000 for an electric light scheme (*ante*, p. 131). In addition to the statement that they did not find that at the inquiry any weight of evidence was submitted of the probability of such a demand for electric lighting in the borough as would in their opinion be sufficient to ensure the financial success of the undertaking, the Board advance other reasons for withholding their consent. One objection to the proposed scheme was that the building intended to be adopted as a generating station was quite unfit for the purpose; but the sting of their letter to the Corporation was in the tail: "The Board are, moreover, of opinion that in any case the primary sanitary needs of the borough should be satisfactorily met before any capital expenditure is incurred on works of electric lighting. A proper system of disposing of the sewage of the borough is a matter of urgent necessity, and it appears that an infectious diseases hospital is also needed. These matters should receive the immediate consideration of the Town Council." The Mayor (Alderman H. D. Simpson), when the matter was under consideration by the Council, said it appeared "that a body like the Corporation, elected by the burgesses, did not know the requirements of the town as well as the Local Government Board;" and nobody contradicted him. Another member (in announcing his intention of retiring from the Council, of which he had been a member for a considerable number of years) said a recent statement in the Press, that the insanitary condition of the town was the reason for the Board's refusal to sanction the electric lighting scheme, was a libellous one. It may be so; the law relating to libel is a difficult one to understand.

The Windsor Royal Gas Company have placed an order with Messrs. Robert Dempster and Sons, Limited, of Elland, to telescope one of their existing gasholders.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

We have had an auspicious beginning to-night with the work of the session in connection with the Western District of the Scottish Junior Gas Association. This session the Association are to be much more comfortably housed than they were last winter. A nicely furnished room, with seating accommodation fixed on a gentle slope, has been allotted to them. This gives better acoustics than were formerly enjoyed. As to this, it may be said that a class-room is seldom a good place for a discussion to be held in, because, when the seats are placed on a steeply-angled floor, speakers in the upper rows are not well heard by those in front. In such places, speakers should always be made to come to the platform; and then everyone hears. As I have said, we shall be much better off in that respect this session. A word as to the building. It is a new one, and very extensive; yet to-night nearly every room was occupied. I call attention to this, as an indication of the extent to which technical education is now carried. Two of the rooms were to-night occupied by students in gas manufacture —one being the meeting of the Association, and the other Mr. O'Connor's class, which was held earlier, in another place. It will be observed from the report that the Western District had the same trouble as the Eastern District with respect to the manner of nominating office-bearers; and that they, too, have altered one of the rules, so as to get over the difficulty. Instead of nominations by post, and balloting by paper, in the West the nomination and election is now to take place in the open meeting. With the aid of the blackboard, the scheme worked well to-night; and I would recommend the Eastern District to adopt the same method next year. This would bring both the Districts into uniformity again; and it is much the simpler and less expensive and troublesome way of doing the work—the latter of which is a consideration where no salary is paid to the Secretary. Mr. A. Wilson, in spite of a cold, attended the meeting, for which kindness the members were grateful, as it was an indication that his interest in the Association is as strong as ever. A short but thoughtful and penetrating address was given by the new President (Mr. J. Bell, of Airdrie); and this, with the little discussion that took place upon it, formed the whole of the technical business of the meeting. The retiring President (Mr. J. Lowe, of Glasgow) was anxious to take the position of a private member; but it was the unanimous wish of the meeting that he should be placed on the Council, in order to retain the benefit of his experience. In deference to this feeling, he graciously allowed himself to be elected. There was general regret that the Hon. Secretary and Treasurer (Mr. W. M. Mason, of Glasgow) had made up his mind not to seek re-election, and would not be coaxed to alter his resolution. He made a most excellent Secretary, doing a large amount of work for the Association with the utmost exactitude and affability.

On Monday of this week an act of fraternity which is highly to be commended took place, in a visit of the Edinburgh and Leith Gas Commissioners and their officials to the Provan Gas-Works of the Glasgow Corporation. The Commissioners number 23; and it is evidence of how highly the permission to inspect those grand works was valued, that there were 16 visitors. The Engineers of both cities were present. The works were shown to the fullest; and afterwards the Commissioners were entertained by their hosts. At this ceremony, the Commissioners freely expressed their indebtedness to the Corporation of Glasgow for the high privilege which had been accorded to them, and their great pleasure at being shown over so splendidly designed and equipped works. An invitation to visit the Granton works of the Commissioners was at once extended to the Gas Committee and officials of the Glasgow Corporation, and was, of course, accepted. The incident is one which can only be contemplated with the liveliest feelings of satisfaction.

On Wednesday evening a meeting was held in the burgh court-room at Perth of those interested in the sale of incandescent gas-mantles, burners, and appliances, to consider proposals for the supply of such articles. Mr. J. Cuthbert, the Convener of the Gas Committee of the Corporation, presided, and explained that the department proposed to keep a stock of the appliances in premises in Charles Street, and to supply the trade. The public would thus get standard articles at reasonable prices. Mr. Cuthbert read a report by Mr. W. B. M'Lusky, the Gas Manager, giving details of the scheme. The meeting—a very representative one—unanimously agreed to the proposals.

There was read to the Grangemouth Town Council on Monday a letter from the Secretary to the Gas Company, in reply to the offer of the Council to take over the gas undertaking by arbitration on the basis that there was no compulsory sale. The Directors, the letter stated, had never taken up the position of opposing the acquisition of the undertaking by the burgh, if the Council so desired; and they had given the Council the information asked for, all along understanding that the Town Council would acquire on the basis of a compulsory sale. They could not understand how the Council could now maintain that they could acquire on any other basis. Under these circumstances, the Directors did not see how they could, in the interests of the shareholders, accept the resolution of the Council, but considered that the procedure under the Act should be allowed to take its course, unless a price could be arranged amicably in the meantime; and if the Town Council were willing to increase their offer to approximately the sum asked by the Directors, they would be prepared to consider such amended offer. The letter was remitted to the Gas Committee.

The Denny Town Council on Tuesday received the report of the Committee appointed last month, on the motion of Mr. Sawers, to ascertain whether the yield of gas per ton of coal was satisfactory. The Committee's report was that, after comparing the yield of gas with that of other works, and going fully into the whole matter, they were of opinion that the yield was satisfactory. Mr. Scott, the Convener, moved approval of the finding of the Committee. Mr. Sawers did not agree

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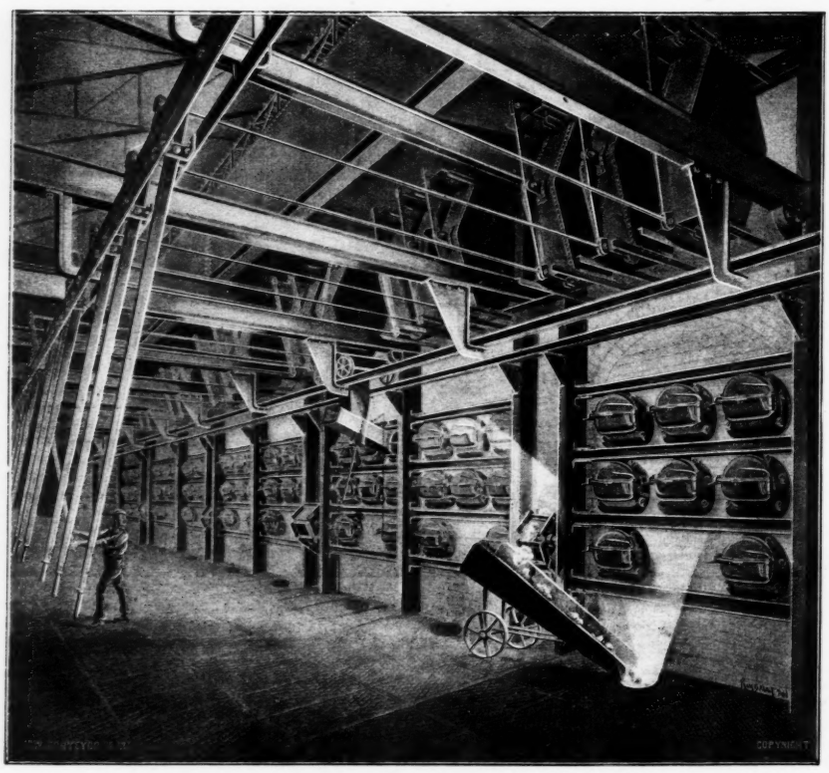
with this finding. He went into a comparison of the results obtained at Denny and at Kilsyth. Taking the last five years into account, he found that at Kilsyth they had made on an average £486 worth more gas per year than at Denny, on the same quantity of coal carbonized. At Kilsyth they paid £117 a year more for interest and other charges than at Denny. The Corporation of Kilsyth had depreciated their works to the amount of £2762, whereas in Denny they had depreciated to the amount of only £660. At Denny the yield of gas per ton of coal was 1336 cubic feet less than at Kilsyth. Provost Hunter said that Mr. Sawers' argument was based on a fallacy. If they did not carbonize the coal too much, they would get better char, and a larger quantity of tar and ammoniacal liquor. They had got information from seventeen different places throughout the length and breadth of Scotland; and he felt certain that there was something radically wrong in the statistics as to Kilsyth. If they took Coatbridge, for instance, where the gas undertaking was managed by probably the ablest man in Scotland, the quantity of gas which was taken from the coal was 7828 cubic feet—1000 feet less than in Denny. In Glasgow they obtained 9396 cubic feet; while in Denny the make of gas was considerably over 9000 cubic feet. The Committee had looked most carefully into the matter, and had spent long hours discussing it, with the view of informing Mr. Sawers and themselves. Taking everything into consideration, the works were in a very hopeful condition; and there were few things they could suggest, in the way of alterations, that could materially improve the undertaking. Mr. Lochhead pointed out that the conditions of carbonizing in Glasgow and in Denny were very different. In Glasgow, they could discharge and charge a retort in 75 seconds; whereas in Denny it took them 6½ minutes. This meant that the time lost in carbonizing a ton of coal in Glasgow was 10 minutes, and in Denny 52 minutes. The Town Clerk made a statement on the subject, in which he said that the apparent output could be considerably altered by increasing the temperature in the meter-house. In their own meter-house, the temperature was comparatively low; while in Kilsyth, he understood, the benzol plant was in the meter-house, which raised the temperature to a considerable extent, and had the effect of expanding the gas passing through the meter, and making it measure more. Mr. Sawers said he was satisfied with the statement made by the Clerk; and the Council proceeded to the next business—the report of the Committee, of course, being adopted.

The Gas Committee reported to the Hamilton Town Council on Tuesday that they had again considered the question of the reduction of the price of gas to consumers outside the burgh, and had agreed to adhere to the recommendation in their minutes of the last meeting that the price of gas be reduced to the same rate as within the burgh. Bailie Hamilton, who moved the adoption of the report, said that the reason for fixing the higher rate for gas supplied outside the burgh was that they had been informed by the Manager that there was considerable leakage there; but they were now told that there was no more leakage outside the burgh than inside, and hence there was not the same reason for having different prices. Mr. Cassells moved that they do not come to a decision in the matter in the meantime, as it was being considered by a Special Committee. The Council, by twelve votes to three, adopted the recommendation of the Committee.

The Town Clerk of Lanark reported to the Council on Monday that the Special Committee in connection with the proposal to purchase the Gas Company's undertaking had resolved to ask a meeting with the Directors to discuss the question, and that he had received a letter from the Secretary stating that the Directors were willing to meet the Committee on any day that might be suitable. There was laid before the Council a circular from the Secretary intimating an extraordinary general meeting of the Company, to be held on Oct. 20, for the purpose of confirming a special resolution adopted by the shareholders on Sept. 21, to the effect that the Company should feu, or lease for 99 years, a piece of ground in the vicinity of the gas-works, for the extension of the works and the erection of a gasholder of 100,000 cubic feet capacity. Another circular was read, calling a second extraordinary general meeting for the same day, to decide as to the raising of £2500 to pay for the cost of a gasholder and the acquiring of the ground; and to decide whether the sum should be raised by 4 per cent. debenture bonds, in amounts of not less than £500, or by increasing the share capital of the Company to the extent of £1000 and issuing debenture bonds for the balance. Mr. Macleay said that, as instructed by the Council, he attended the meeting on Sept. 24, and moved an amendment to the resolution, but did not find a seconder. Mr. Lamb said he had all along been of one mind, and that was the resolution arrived at. The time had come when a new gasholder was urgently required. They could not get away from the fact that there had been many complaints as to the gas; and it was no use their grumbling unless they gave the Company power to put matters right. Mr. Macleay was appointed to attend both meetings, as the representative of the Council, and to vote that the £2500 be raised solely by debenture bonds.

The proposed transfer of the Monifieth gas undertaking, to which I referred last week, has been agreed to. On Tuesday evening, Mr. J. Fenton, the Convener of the Purchase Committee, gave a statement in the Town Council of the proceedings leading up to the purchase. The price, he said, was to be £6400. No effort had been spared by him and his colleagues to carry out the transfer on as favourable terms as possible to the community. He read the deed of purchase, and moved that it be approved of. Provost Stewart, in support of the motion, said he was greatly pleased to know that a valuable asset was likely to come under the control of the Council. There was a large piece of ground in connection with the works, on the foreshore, which was of the utmost importance to the Council. There were no restrictions as to the use of the ground; and he was fully convinced that it would prove very valuable. The motion was adopted. The shareholders of the Company met afterwards and unanimously agreed to ratify the agreement which had been come to by the Directors on their behalf, and by the Council on behalf of the community. The transfer takes place at once.

INCLINED RETORTS.



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How near the Edinburgh district was plunged into a dire water famine was brought out by what transpired at a meeting of the Trust on Thursday. It was there stated by Sir Andrew M'Donald that, with the exception of the Talla, the reservoirs belonging to the Trust were practically empty. It was satisfactory to know that, notwithstanding the remarks which had been made regarding the Talla, it was the source of supply which was standing the city in good stead at the present moment.

There is alarm in the County of Fife over the condition of the water supply. At the Kirkcaldy Water Commission on Tuesday, there was a long discussion upon the subject. The Superintendent reported that the total water in the combined reservoirs on Saturday morning was 116 million gallons, as compared with 513 million gallons at the same date last year; and that since Saturday they had lost other 5 million gallons—the daily loss being over 1½ million gallons.

A new scheme is being promoted for the supply of water to the towns of Troon and Prestwich, and to several villages in the Ayr district. The Ayr District Committee are the promoters. The source of supply is to be Loch Braden, in the parish of Straiton, the water of which is reported to be excellent in quality, and abundant. The proposal was made some time ago at a meeting of the District Committee with representatives of the two burghs that the scheme should be promoted on the footing that each of the three authorities should take 250,000 gallons of water daily, and pay one-third of the cost; but that if, as was suggested, the burgh of Troon should require more than 250,000 gallons, they should pay the extra cost. This proposal was agreed to; and Mr. J. Eaglesham, of Ayr, has been instructed to prepare schemes and estimates for supplies of 750,000, 1,000,000, and 1,500,000 gallons respectively. The Local Government Board are pressing the District Committee to introduce new water supplies to the villages under the administration of the Committee.

Electric Light Failure at Battersea.—On Saturday night, owing to the breakdown of some of the machinery at the generating station, Battersea was plunged in darkness from about nine to ten o'clock. The central public library had to be closed; and many of the large shopkeepers were obliged to resort to candles and lamps, while some even had to suspend business.

Praise for Rochdale Gas-Works Management.—In furnishing his annual report on the finances of the town, Mr. R. Thompson, one of the Elective Auditors for Rochdale, said the gas profit for the past year was £19,598; while the total for the last four years was £57,343. During this period, £7325 was added to the reserve fund, which now stood at £17,199. The gas-works was the best-managed concern in the town. If capitalized to-day at 5 per cent., it would realize £500,000. The outstanding loans and stock at the present time equalled £225,256; and there was standing to the credit of the sinking fund £37,485. By the Council acquiring the gas-works, the rates had been relieved to the extent of over £300,000.

CURRENT SALES OF GAS PRODUCTS.

Week ending Oct. 14.

The London pitch market continues in a strong position, and 32s. net has been paid; while sellers now ask more money. Toluol 90 per cent. has been done at 10½d. net; and there is also a good demand for benzol and solvent naphtha at improving prices. Sixties crude carbolic acid is unaltered. There are several inquiries for ordinary London creosote, for which article about 2d. net in bulk is obtainable. The value of sulphate of ammonia has also advanced, and is now quoted at about £12 17s. 6d. to £13 on Beckton terms.

Sulphate of Ammonia. LIVERPOOL, *Oct.* 14.

There has been a firm market throughout the week, and there has been a slight improvement in values. The closing quotation f.o.b. Leith and Liverpool is consequently £12 16s. 3d. per ton, while Hull is nominally £12 12s. 6d. per ton. For October-December delivery £12 17s. 6d. per ton is quoted f.o.b. Leith and Liverpool; but so far this price is not reported paid. Demand is still mainly for covering contracts, and for Japan and the Colonies; the Continent remaining quite indifferent, notwithstanding the improvement in nitrate of soda. There has been considerable inquiry for spring delivery, but the views of buyers are not above prompt prices; while makers are looking for an advance.

Nitrate of Soda.

In sympathy with the improved forward position, the spot market has advanced to 10s. 9d. and 11s. per cwt. for ordinary and refined qualities respectively.

Tar Products. LONDON, *Oct.* 14.

The demand continues very good, and prices generally are well maintained. Benzol is still very scarce. London refiners are reported to have declined 10d. for October-December, and are now quoting 10½d., which price, however, consumers will not pay at present. In 50 90 per cent. there is no business of importance to report. Makers ask 9½d. at Northern ports; but consumers do not seem particularly anxious for this quality. The demand for toluol is very strong, and 10½d. has again been refused by London refiners, who appear to be well sold to the end of the present year. There is a strong inquiry over next year; but refiners will not at present offer over this period. Creosote continues in very good demand, and the best London producers are now asking 1⅛d. to 2d. for delivery over next year. It, however, remains to be seen whether the American buyers will respond to this advance in value, as very much depends upon the demand from this quarter. Yorkshire makers are still quoting from 1⅜d. to 1½d.; but consumers in the North do not seem particularly anxious to purchase just at present. Solvent naphtha is very scarce, and there is hardly any offering for early delivery. Some ordinary

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90 per cent. at 160° was sold at 10d.; but there is great difficulty in obtaining prompt delivery. There is evidently a good inquiry for January-June; but just now makers do not appear anxious to sell over this period. Carbolic acid continues in very good demand, at 1s. 8¼d. to 1s. 8½d. for October-December; but for January-June makers will not consider anything less than 1s. 9d. In crystals there is not very much business doing by the English producers, as German manufacturers are undoubtedly accepting lower quotations than those ruling here. At the same time, there is very little offering, and the tendency is slightly upward, especially for forward delivery. The demand for pitch continues good for January-June delivery; but as regards South Wales, consumers appear now to have supplied their requirements, and there is not so much inquiry from this quarter. London makers, as a rule, are not offering at the moment; while as regards Yorkshire, manufacturers do not appear at all anxious to sell for forward delivery just at present, doubtless owing to the uncertainty which prevails as regards some large tar contracts.

The average values during the week were: Tar, 17s. to 22s.; pitch, London, 30s. to 30s. 6d.; east coast, 29s. to 29s. 6d.; west coast, 27s. 6d. to 28s. Benzol, 90 per cent., 10d. to 10¼d.; 50-90 per cent., 9½d. Toluol, 10½d. Crude naphtha, 3⅜d.; solvent naphtha, 9⅜d. to 10¼d.; heavy naphtha, 10½d. to 11d. Creosote, London, 1⅜d.; North, 1⅜d. Heavy oils, 2⅛d. to 2 5/16d. Carbolic acid, 60 per cent., 1s. 8¼d. to 1s. 8½d. Refined naphthalene, £4 10s. to £8 10s.; salts, 15s. to 17s. Anthracene, "A" quality, 1½d. to 1⅝d.; "B" quality, unsaleable.

Sulphate of Ammonia.

This article is still in very strong demand; and prices have slightly advanced during the past week. Beckton are now asking £13 for October-December; but for January-April they quote still higher prices, and do not appear particularly anxious to sell for next year's delivery. In Leith, business has been done at £12 16s. 3d. for prompt shipment; but makers as a rule ask £12 17s. 6d., at which price some business is reported for October-December delivery. Prices continue very firm in Liverpool, £12 15s. having again been paid for prompt shipment. There has not been much business of importance doing in Hull; but the price may now be taken as from £12 13s. 9d. to £12 15s., according to make, although early in the week sales were reported at £12 12s. 6d. for prompt shipment.

COAL TRADE REPORTS.

Lancashire Coal Trade.

Although the general conditions governing the Lancashire coal trade are decidedly improving, colliery owners have not yet raised the standard of prices. The application of the colliery proprietors for a reduction of 5 per cent. in wages in the Federated districts of England and North Wales has been further postponed until to-morrow (Wednesday), when another meeting of the Coal Conciliation Board, of which Lord James of Hereford is the independent Chairman, is to be held at the Westminster Palace Hotel. Considering the present situation, and the fact that prices have gone up 1s. per ton in Yorkshire, it is expected that no change will be made in the rate of wages this year. The cotton, engineering, and general trades of the County Palatine have become exceedingly prosperous of late, so that there is a very favourable outlook for the coal trade. Engine and furnace coals are hardening in price; but there is no change in other sorts. Shipping coal is steady. Coke is in fair demand. Gas coal and cannel are being delivered under contract rather more freely. The quotations are: Best house coal, 13s. to 14s. per ton at the pit; secondary, 12s. to 13s.; common, 9s. to 10s.; steam and forge, 8s. 6d. to 9s.; best engine fuel, 7s. 6d. to 8s. 6d. and even higher; slack, 7s. 6d. to 8s.; medium, 6s. to 7s.; and common, 5s. to 5s. 9d. Coal for shipping varies from 9s. to 10s. delivered at the Ship Canal tips.

Northern Coal Trade.

There is a steady but not very pressing demand for coals generally; the lessened shipments to the northern Baltic ports having some effect in checking the enlarging home demand's result. In steam coal, there is some inequality—best Northumbrian kinds being about 9s. 1½d. to 9s. 4d. per ton f.o.b., with a fair demand. Second-class steams are generally firm at about 8s. 6d. per ton; and steam smalls are steady at 4s. 9d. to 5s. 6d. Bunker coals are steady, as a rule; and the increased demand for this class may have its effect on the gas coal trade in some degree. The consumption of Durham gas coals is now steadily increasing; and the work at the collieries is generally full, but without the pressure that may be expected a little later in the season. There is a good demand for best gas coals; and the collieries producing these are well booked forward, and their prices are high for occasional sales. Values of Durham gas coals are generally from about 8s. to 9s. per ton f.o.b.; but for forward deliveries, the quotation is sometimes more. One or two contracts for gas coals for shipment have been made, and the prices are within those above named for sales of cargoes. In coke, the market is firm; but gas coke does not share in the improvement, partly owing to the larger production now, and partly to the fact that the exports of this coke have been limited. The variation between the values of gas coke at the shipping ports and the inland centres is so great that quotation of prices is difficult this week.

Scotch Coal Trade.

There is again a slightly better tone in the market, the output moving off a little more freely; but prices are not quotably higher. There is a feeling that an advance in price will soon be experienced. The prices quoted are: Main 7s. 3d. to 7s. 6d. per ton, f.o.b. Glasgow, ell 8s. to 9s., and splint 8s. 9d. to 9s. The shipments for the week amounted to 225,630 tons—a decrease of 3717 tons upon the preceding week; and of 6384 tons upon the corresponding week of last year. For the year to date, the total shipments have been 9,354,429 tons—an increase of 452,962 tons upon 1904.

NELSON'S

1805.

"England expects that every man this day will do his duty."

1905.

"Richmond's know their Cookers this and every day will do their duty."

CENTENARY—Oct. 21.

ADVERTISEMENT OF THE RICHMOND GAS STOVE & METER CO., LTD. LONDON: 132, QUEEN VICTORIA STREET, E.C. WORKS & OFFICES: WARRINGTON & STRATFORD.

Crewe Water Supply.—All the water used in Crewe, as many of our readers are aware, is purchased from the London and North-Western Railway Company; but recently the Council engaged an expert to report upon the practicability of finding another source. In his report which has lately been issued, he states that a sufficient supply of water for the town can be obtained close by at a saving of £2000 a year to the ratepayers.

Public Lighting of Burnham.—The Burnham Urban District Council have received a letter from the Secretary of the local Gas Company offering to light the town at the rate of £3 3s. 4d. per lamp for a period of three years. The Council have accepted the tender, at the same time expressing the hope that modern fittings would be adopted during the first year. The previous charge was £3 7s. 6d. per lamp; and the town was not lit every night.

The Sutton Gas Company and their Sulphate Effluent.—The discussion with regard to the disposal of their sulphate effluent by the Gas Company is again being raised at Sutton. The Company claim the right to turn the effluent from their new sulphate of ammonia plant into the public sewers; but to this the Urban District Council object, on the ground that when they did so on the last occasion the plant was working, the effluent killed the bacteria in the beds at the sewage farm, and prevented the purification of the sewage. At the last meeting of the Council, a letter was read from the Company, stating that they proposed at once to re-commence the manufacture of sulphate of ammonia. One member proposed that the Council should apply for an interim injunction; but the suggestion was not adopted. The Surveyor and Medical Officer of Health are, however, to obtain samples of the effluent as it enters the sewers, for the purpose of analysis by an expert.

Bolton Gas and Water Supply.—The official Blue-Book of the Bolton Corporation for the past financial year, prepared by the Borough Treasurer (Mr. George Swainson), states that on gas revenue account there was a total expenditure of £161,007, including £22,068, the portion of profits distributed among the various districts in aid of the rates. Manufacture cost £70,190, salaries £9284, distribution £8756, management £2409, rates and taxes £8512, interest and annuities £24,149, sinking fund amount £4096, and reserve for depreciation account £18,685. On the other side, sales of gas produced £118,553, residual products £39,998, profits from fittings £369, and chief rents, &c., £1156. The assets of the department are given as £854,418; and the amount spent on land, buildings, and service-pipes is put down at £740,316. The assets of the Water Committee are £982,733. The old works and plant cost roughly £180,000, and something like £786,000 has since been disbursed on new works, parliamentary charges, mains, and connections, &c. The year's expenditure on revenue account was £72,137; this including £9800 profit voted in relief of the rates. The fittings trade also produced a profit of £1026. Income from water-rentals totalled £65,969; and the quantity of water consumed through meters was 827,336,000 gallons.

Display of Incandescent Gas Lighting at Bristol.—The Bristol Gas Company gave the visitors to the city last week, on the occasion of the Musical Festival, an opportunity of seeing the capabilities of incandescent gas lighting. In front of their new offices they had three of Keith's 1200-candle power high-pressure lamps, and under the canopy of the Colston Hall three Welsbach self-intensifying single-mantle lamps, each of 600-candle power. The cost of the former is rather less than 1d. per hour, and that of the latter about half this amount. The lighting was inspected by the Directors of the Gas Company and of the Colston Hall last Tuesday, and afforded much satisfaction. While the gas-lamps gave a splendid light over a large area, the electric arc lamps appeared by comparison dull and wanting in diffusive power.

Halifax Gas Affairs.—Judging by statements appearing in the papers, it would not just at present be altogether correct to describe the Halifax Gas Committee as a "happy family." Correspondence on the tar-works controversy, the gas workers' wages, and other questions, has, we learn, lately been proceeding between the Acting Chairman of the Committee (Mr. J. Collinson) and Mr. Robert Morley (a Labour member of the Committee), in which the latter made serious allegations against Mr. Collinson and the Committee. This correspondence was read at the last meeting of the Committee; and a stormy discussion followed—one member, it is affirmed, threatening an action against Mr. Morley. Ultimately, however, Mr. Morley unreservedly withdrew his imputations; and therefore the matter was allowed to drop, though the fact that the withdrawal had been made was duly entered on the minutes.

Supplying a Lamp as an Advertisement.—At the Clerkenwell County Court, on Friday, an action was brought by Mr. A. E. Podmore, trading as Messrs. A. E. Podmore and Co., against Mr. W. T. Simons, a builder and undertaker, of Nottingham, to recover £2 11s. 3d. in respect of a lamp supplied. The evidence of plaintiff's agent was to the effect that defendant agreed, as an ordinary business transaction, to take the lamp, which was to be placed outside his establishment. Defendant said the agent told him that it was a new light, between the Keith and the Lucas; and if he could only get one put up in Nottingham, he would get several orders for it. He further said: "If you can get me a position for one, I will give it to you." Defendant went on to say that his establishment was lighted with electricity, and the new lamp was of no earthly use to him; but as the agent pressed his offer, he agreed to take one, though not to pay for it. It has never been lighted since it was put up. Judge Edge: Then it has not been much of an advertisement for plaintiff? Defendant: He wanted it to be put up, so that he could have it lighted when he wished to show it to anyone. The tradesman who fitted up the lamp said defendant told him at the time that it had been given to him by plaintiff's representative. Mr. Simons paid for fixing it up. After hearing the evidence, Judge Edge said he was satisfied that there was no contract for the sale of the lamp, and the verdict would be for defendant. Plaintiff's Solicitor: Can we have our lamp back? Judge Edge: No; I believe it was given as an advertisement. But it is a matter entirely for Mr. Simons.

INSTITUTE OF HYGIENE

No 1084

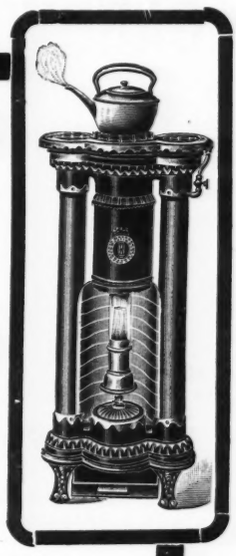
Date of Issue 2nd February 1905

Certificate

This is to Certify that the Patent Syphon Stove of Messrs S. Clark & Co of London has been passed by the Examining Board of the Institute of Hygiene as fulfilling the Standard of Merit required by them as evidence of which We the undersigned Members of the Executive Council have affixed the Seal of the Institute hereon.

Certificate issued by the Institute of Hygiene held good until unless further granted for a longer period then one year, and no method not taken under the date of such certificate connection is to be made, as to the standard being maintained.

Issued this Second day of February 1905



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German Incandescent Gas-Burner Trade.—The "Zeitschrift für Beleuchtungswesen" states that "business in incandescent gas-burners continues as brisk as ever; but prices have reached such a low level that it is almost a puzzle how they can pay. This specially refers to the cheap article for export; prices hardly covering more than cost of material and wages. Better-class factories, therefore, devote their attention chiefly to the production of a superior article, which, at any rate, yields them a modest profit. The better-class burner meets with an increased demand in Germany, and also finds a market in Scandinavia, in the Eastern countries, France, Italy, and Switzerland; whereas for export in England, and notably to South America, goods of the lowest quality are frequently produced, which certainly do not enhance the reputation of German industry."

Taunton Water Supply.—An inquiry has been held by Mr. R. H. Bicknell, on behalf of the Local Government Board, into an application by the Taunton Town Council for permission to borrow £6500 for the purpose of completing the construction of the Luxhay reservoir. The Town Clerk explained that a previous application in connection with this reservoir was for £21,000; but the Local Government Board sanctioned £20,000 instead, owing to the fact that the Council had reached the limit of their borrowing powers under the Public Health Act. The amount of the contract for the reservoir was £22,653; and the total sum expended on it was £26,500. The highest tender received for the work was £107,000; and they had several of over £60,000. Mr. H. T. Coles, the Water-Works Manager, said that the storage at present amounted to 28½ million gallons, as against 11 million gallons last year; and this was in spite of the fact that the Corporation had allowed a longer supply than last year. When the reservoir was full, they would be able to give a constant supply to the town. At the conclusion of the inquiry, the Inspector visited the reservoir, with the appearance of which he expressed himself as being highly pleased.

The Colour of the Birmingham Welsh Water.—By means of the tintometer, some interesting records have been compiled, on behalf of the Birmingham Water Committee, of the amount of discoloration of the Welsh water each day from the beginning of the year. The test is made with the three primary colours, red, yellow, and blue; and there is naturally considerable variation in the daily records. During the first part of the year the yellow tint largely predominated, and the discoloration was most marked in January. After that the colour was gradually reduced; the lowest point being touched in May, June, and July. In fact, on one day in June the water was recorded as being so clear as to resemble distilled water. Since the beginning of August, there has been less transparency; and when the rainy period set in after a drought, the colour of the water deepened until it became almost as brown as it was in the early part of the year. It is believed, however, that the highest readings have now been taken; and that the discoloration will gradually become less marked. The tint of the water does not in any way affect its quality for domestic purposes; the discoloration being attributed to the effects of peat in the gathering ground.

A Gas-Main Ablaze.—Newark pedestrians were somewhat alarmed a few days ago by a large sheet of flame suddenly bursting out of an open grid manhole in the centre of the roadway. Part of the street where this occurred was under repair; and some little distance from the manhole a gang of men were busily engaged with pick and shovel. A smell of gas was noticed; but little was thought of it, until one of the workmen struck a flint with his pick. The spark thus caused was sufficient to ignite the gas. Water was poured into the manhole from a hose-pipe, and the main was plugged with bladders.

Tees Valley Water Board.—The half-yearly report of the Tees Valley Water Board, to be submitted to the Corporations of Stockton, Middlesbrough, and Thornaby, shows the capital expenditure for the half year to have been £66,552, bringing up the total cost of the undertaking to £2,534,292. The income was £54,217, being an increase of £2751 as compared with the preceding half year, and of £3919 as compared with the corresponding half of 1904. The balance carried to net revenue account is £44,104, as compared with £41,366 the previous half year, and £40,151 in the same half of 1904.

Lead Poisoning Cases at Mossley.—At a recent inquest in Mossley, a doctor stated that the water supplied in the town was giving rise to numerous cases of lead poisoning; and this seemed to be borne out by a discussion which subsequently took place in the Council. One member said there were nearly thirty cases in the town; while there were others at Greenfield, which is also supplied from the Ashton Joint Water-Works. The water has been treated continuously during the past ten years; and the Water Board declare that there has been no failure in this direction. An analysis has been made of five samples of water which had been lying in the pipes all night in different parts of the town. In four of these only the minutest trace of lead was found, and in the other none at all. For years galvanized tubing has been used for the services; but a number of lead pipes still exist in the older houses.

Leicester and the Derwent Water Scheme.—Speaking at a Leicester ward meeting, Alderman Vincent said the capital of the Water Department amounted to £950,000, with profits of from £15,000 to £16,000 a year, which was all paid into a sinking fund to meet the cost of the Derwent Water Board supply. If anything was needed to justify this great scheme, it would be justified by the present scarcity of water. The cost of the scheme was estimated at £2,800,000; and as Leicester had to pay 10-28ths, their share would come to £1,000,000. In addition, Leicester had to make a bridge over the Trent for the line of pipes; and also from the Trent to Leicester they had to provide the service-pipes. This would cost £400,000. The interest on £1,400,000, at 4½ per cent., would be £60,000 a year. They would not get water until 1911; but they would have to begin to pay interest some two or three years before. By that time (1909), the accumulated profits from the Water Department he estimated would be £90,000, and perhaps more; but in spite of this, the probability was that in ten years' time they would have an addition to the rates of something like £40,000 a year on this account.

CARBURETTED WATER-GAS APPARATUS

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BLACKBURN	1,250,000	ST. CATHERINES (Remodelled)	250,000	TONBRIDGE	300,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	STRETFORD	500,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	OLDBURY	300,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	TODMORDEN	500,000
BIRKENHEAD	2,250,000	ST. CATHERINES (2nd Cont.)	250,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	YORK (Second Contract)	750,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	ROCHESTER (Second Contract)	500,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	NEWPORT (MON.)	250,000
HALIFAX	1,000,000	YORK	750,000	TOKIO, JAPAN	1,000,000
TORONTO	250,000	ROCHESTER	500,000	PERNAMBUCO (Brazil)	125,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	MALTON	150,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	DULUTH, MINN. (2nd Cont.)	300,000
MONTREAL	500,000	DULUTH, MINN.	300,000	BROCKVILLE (ONT.)	250,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	SMETHWICK	500,000
BELLEVILLE	250,000	LEICESTER	2,000,000	GRAVESEND	300,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	NEWPORT MON. (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	TORONTO (Third Contract)	750,000
		BURNLEY	1,500,000	TORONTO (Fourth Contract)	1,000,000
		KINGSTON-ON-THAMES	1,750,000	MONTREAL, ONT. (2nd Cont.	1,800,000
		ACCRINGTON	500,000	HAMILTON, ONT.	400,000

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.

AND, IN ADDITION, 8,150,000 CUBIC FEET DAILY; also Coal-Gas Plants at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND, CALGARY, and WINNIPEG.

Diminishing Water Reserve at Stockport.—The Stockport Water Committee are experiencing uneasiness on account of the lowness of the water in the reservoirs. The stock is decreasing rapidly; the rainfall having been 1½ inches less than last year. During the past month, only 1¾ inches of rain have fallen in the district; and unless there is soon a heavier downpour, the supply to the consumers will have to be curtailed, as it will be a serious matter to face the winter with practically empty reservoirs. When, however, the pipes from the Kinder to Lyme are laid, and a fresh source of supply is obtained, the cause of anxiety will be removed.

Kingsbridge Water Supply.—Some dissatisfaction is felt at Kingsbridge on account of the short supply of water in certain parts of the district, notwithstanding the recent completion of the new reservoir. The matter was discussed at a meeting of the District Council last Tuesday, when it was stated that the difficulty arose through the mains being partly worn out, and from defective distributing arrangements in general. The Surveyor (Mr. H. Monson) presented a report on the subject in which alternative schemes for overcoming the difficulty were suggested. The more expensive one, which included the laying of a considerable length of new pipes of larger size than those in use, was estimated to cost £600; while the other scheme, without new pipes, could be carried out for £300. The matter was deferred.

A Successful Half Year at Swansea.—Presiding at the eighty-ninth half-yearly meeting of the Swansea Gas Company, Mr. T. Travers Wood congratulated the proprietors upon the successful past half-year's working, notwithstanding that the consumption of gas had been somewhat less, owing to the extremely fine weather. He said the revenue account showed a gross profit of £9299; and there was evidence of a continued steady increase in ordinary and coin-meter consumers. The Board recommended that £5000 be placed to the reserve fund, increasing it to £21,615. Considerable extensions had been made in lighting the borough, and likewise at the Mumbles. The increased use of incandescent burners, and other improvements, had resulted in the somewhat diminished consumption. There were now 7000 gas-stoves in use; and the Directors were giving every attention to this department. The usual dividend was declared.

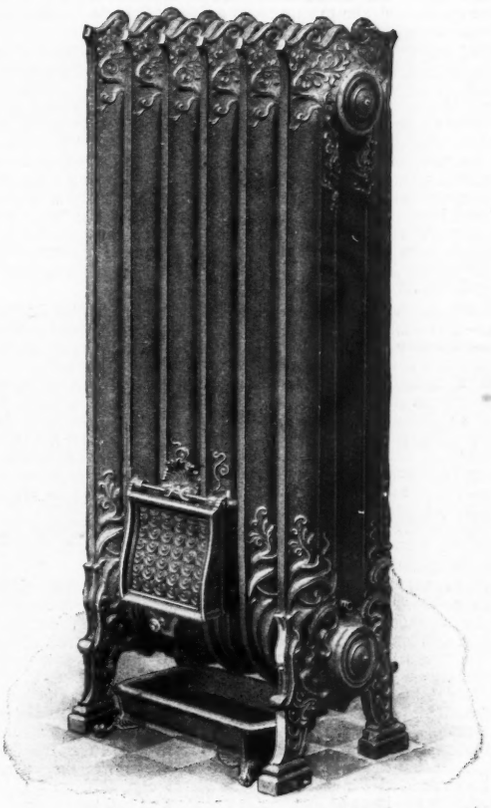
Stockport Plumbers and the Gas Committee.—The Stockport Tradesmen's Association have decided to memorialize the Gas Committee on the subject of the probable intention of the latter body to open a shop where stoves and fittings would be on view. In bringing the matter before the Association, Mr. E. Taylor, a plumber, said that not a tradesman's business in the town would be safe if these methods were going to be adopted by Corporation Committees. He said assurances had been given that the Gas Committee would not compete with the trade; but they would have to "look alive," or they might be defeated by the Committee after all. Another member said the Committee were trying to get in "the thin end of the wedge;" while a third urged that if the contemplated show-room was only for exhibition purposes it would be useless, as there was already a splendid display of lighting apparatus in the shop windows of Stockport plumbers.

Poll on the Shrewsbury Water Question.—A poll has just been taken of the ratepayers of Shrewsbury with reference to a new water scheme for the borough. Two proposals were submitted—viz., the Castle Pulverbatch scheme, which it is estimated would cost £148,000, apart from the outlay for the gathering ground, and a river scheme, which it is calculated would cost £88,000. It was stated on the voting papers that one or other of the schemes must be carried out, as it was absolutely necessary that steps should be immediately taken to provide an adequate and improved water supply. The voting was as follows: For the Castle Pulverbatch scheme, 1903; for the river scheme, 923. There were 526 spoilt papers; and 2207 voting papers were not returned. This result practically leaves unsolved the problem which has engaged the attention of the Corporation for many years. Last year the ratepayers rejected the Castle Pulverbatch scheme; and before the Council can proceed, they must obtain an Act of Parliament, which will require the sanction of two-thirds of the ratepayers.

Quality of the Gas at Rhyl.—Evidently low-grade gas will not be popular at Rhyl, for we notice that one of the members of the Urban District Council has been complaining that the present supply is "of a very poor illuminating power; being only 16·73-candle power." This is very generally regarded as a good quality nowadays; but it seems that the Rhyl gas has another defect, for the gentleman in question described it as "very dirty." The Gas Engineer (Mr. L. G. Hall) stated that during the past six months he had received no complaints; but another member remarked that this experience was different from that of councillors, for many people had called his attention to the matter. In one quarter faulty testing apparatus was suggested as an explanation; while in another, bad burners were hinted at as the possible cause of the poor light. But whatever ground there may be for the complaints, we are glad to see that the Rhyl councillors are at least impartial in their criticism, for one of them, after stating that the gas "was the most inferior light he had ever had experience of," immediately added that the same remarks applied to the electric light.

Penzance Water Supply.—Mr. F. Latham, the Borough Surveyor of Penzance, presented to the Town Council last Wednesday a long report on the water supply. He reminded the Council that in 1899 the supply was so restricted that for six weeks in the summer it had to be intermittent, and the use of water very much curtailed. Since then it had been supplemented by pumping from the Polteggan well, and it had been maintained constantly for four summers. In 1904, the number of hours during which pumping was continued was 940, and the quantity of water raised was 16,212,000 gallons; the cost being about 1d. per 1000 gallons. During the present year they had pumped for 1530 hours, and raised 22,007,000 gallons. The cost of pumping might be reduced by the use of good steam coal. For 24 days and nights the pump was worked continuously, and the incoming water at the finish was as free as when the bottom of the adit was reached. A recent test showed that the water raised from the well and that flowing from the stream were sufficient to supply the needs of the town without drawing on the reservoirs. The consumption was from 400,000 to 450,000 gallons per day; and the well yielded 250,000 gallons. Great satisfaction was expressed with the report.

PARKINSON'S NEW RADIATOR.



The "WESTMINSTER."

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(*Parkinson Branch*),

COTTAGE LANE, CITY ROAD, LONDON.

BELL BARN ROAD, BIRMINGHAM.

Gas for Heating and Cooking Purposes in St. Petersburg.—The "Novoe Vremya" says that in St. Petersburg a Company is being formed for the purpose of exploiting gas for cooking and bath-heating. The Company will not only undertake the heating of rooms by gas, but also the installation of cooking-ranges; transforming the present fire-places, so that in the winter the poor may have their rooms heated more cheaply even than by wood.

A Complaint and an Explanation.—The Hull Gas and Water Committee have received from a ratepayer a complaint of the "wre'ched supply" of gas at his house. The writer, who remarks that he cannot think he is getting the full illuminating power to which he is entitled, suggests that the Corporation could exercise more supervision over a matter of this kind, and help him to get something better; and he added that he had been unable to read except under great discomfort. The explanation of this condition of affairs was furnished by a communication from the Gas Company, who stated that the consumer in question used old-fashioned flat-flame burners, and thick opal globes; and that he would not allow anything to be done. The gas supplied was, they said, of the statutory illuminating power.

Woking District Gas Company.—At the meeting of the Woking District Gas Company last week, a final dividend of 2 per cent. was recommended to be paid for the year ended June 30—making a total dividend for the twelve months of 5 per cent., as compared with 7 per cent. for the previous year. The report stated that the mains had been extended to Knaphill, and a large trunk main laid from the works to the centre of the town; while a new holder was in course of erection, and new carbonizing plant nearly completed. The Directors expected this to result in more economical working. The share capital had been increased during the year from £21,360 to £34,946. An animated discussion took place in reference to the report and accounts; and the meeting was adjourned for a report from the Engineers as to the new works.

Oil-Lamps for Donaghadee.—The Donaghadee Town Commissioners, in consequence of a dispute with the Gas Company, have resolved to advertise for 33 oil-lamps of 50-candle power for the lighting of the streets. These are to be suitable for use in lamp-posts which have just been erected, and which were originally intended to contain gas-burners. Some question has, however, arisen as to the position of a few of the columns; and this had led to the proposal to substitute oil. Apparently the Gas Company were desirous that in one street the pillars should be removed from the side on which they had been placed to the other side of the road; but the Commissioners say the agreement was that the Company should connect the lamps from the mains to the bottom of each column, and that no places had been specified, or any particular side of the street arranged for, for the lamps.

Penny-in-the-Slot Gas-Meters Decrease Petroleum Lamp Accidents.—The Chief Officer of the Public Control Department of the London County Council (Mr. Alfred Spencer) states in his annual report, which is noticed in another part of the "JOURNAL," that during the year 1904-5 the Council's inspectors investigated the causes of 190 petroleum lamp accidents, 13 of which were fatal, involving the loss of 14 lives. He says, however, that lamp accidents in London are not so numerous as they were some years ago, and explains that one cause of the decrease is that less oil is used for burning purposes in London than formerly, mainly owing to the gradual introduction of the penny-in-the-slot system of supplying gas in the poorer districts. He gives one instance—that of a large block of model dwellings in Bethnal Green, where, out of 1025 families, only 12 of the residents now use oil; all the others being provided with penny-in-the-slot gas-meters.

Additional Capital for the German Incandescent Gas-Light Company.—It is stated in the recently issued report for 1904-5 of the German Incandescent Gas-Light (Welsbach) Company, who propose to pay a dividend at the rate of 20 per cent., as compared with 12 per cent. for 1903-4, that the favourable course of business development in the new year now entered upon has rendered it necessary to obtain a loan from the Company's bankers in order to provide the additional money required. Since the issue of the report, the Directors have come to the conclusion that, in order to liquidate this floating debt and provide the funds necessary to meet the expansion of business, it is desirable to raise further capital; and at the forthcoming meeting a proposal will be submitted for increasing the share capital from £157,700 to £195,000 by the issue of £37,300 in the form of 746 new shares, which will be taken over by a bank at the price of 325 per cent. and offered to the existing shareholders at 335 per cent., in the proportion of one new share for each batch of five old ones.

Public v. Private Ownership of Gas-Works.—Among the later letters that have been published in the Birmingham Press on the subject of the price of gas for manufacturing purposes, there is one, written anonymously, in which the following paragraph appears: "The fact is that, though the purchase of the Gas Companies by Birmingham has its advantages, it has many disadvantages also. That purchase was negotiated almost simultaneously with the first successful use of the electric light in Paris during the late Emperor's time. Had Birmingham not been committed to the expenditure, there is no doubt that electricity would have been introduced here many years before we saw it. Our Council would have none of it. Every proposal in its favour met with active hostility. The pioneer of electric lighting—one of the leading manufacturers in Birmingham—was well-nigh ruined by the drastic stipulations enforced, with the result that ours was, and is, the worst-lighted city in the three kingdoms. No matter what the cost to the ratepayers, the gas must be made to pay. And, again, when it was sought to introduce the Mond system here, it met with the hostility of our civic authorities. The gas-baby must be nourished. If the price were low, as it ought to be, there are many uses to which gas could be put, to the cheapening of our manufactures and to the advantage of the entire community. But all must give way before the fear that, unless expenditure can be concealed by the use of gas profit, a very considerable change would soon be effected in the constitution of the City Council."

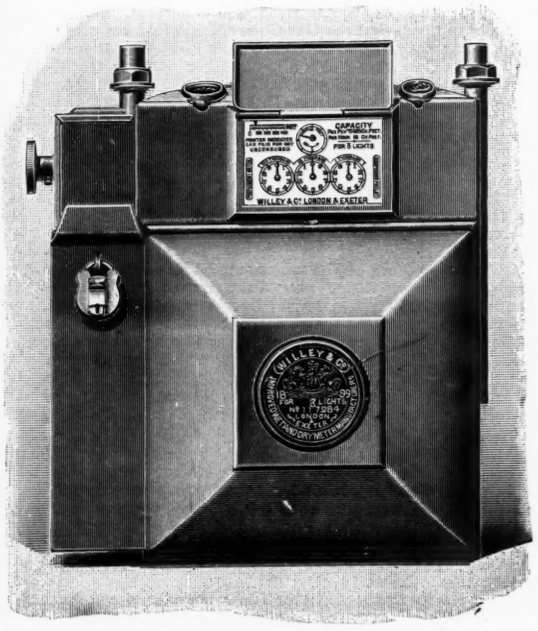
THREE POINTS

of advantage from the many found in our Slot Meters are:

1st.—They are Fraud Proof, and Cannot be tampered with through the Slot.

2nd.—The Slot is closed when the maximum number of Coins have been inserted.

3rd.—Our Price-Changing System is the Simplest, Quickest, and most Accurate yet devised.



ALL PARTS INTERCHANGEABLE.

Tens of Thousands in use, and adopted exclusively by many Gas Companies.

WILLEY & CO., LTD., LONDON & EXETER.

AGENTS FOR SCOTLAND:

D. M. NELSON & CO., 53, WATERLOO STREET, GLASGOW.

Morley Gas Supply.—From the Morley Corporation's annual abstract of accounts for the year ended March 31, it appears that there was a balance of profit on the gas-works of £984, after £3400 had been transferred to the relief of the general district rate. There was a substantial decrease in the cost of the manufacture of gas; the amount being £8062, as compared with £8574 in 1904. A saving of nearly £500 was also effected in the purchase of coal. Receipts from the sale of gas amounted to £10,353, or a decrease of between £500 and £600 compared with the previous year. Nearly 64 million cubic feet of gas were sold for lighting, at 2s. 9d. per 1000 cubic feet, producing £8774; and £3182 was received from prepayment meters. Residual products realized £5032. The cost of distribution was £1246, which was a slight reduction on the previous year.

Leeds Gas Workers and the Unemployed.—On Sunday a meeting of Leeds gas workers was called to consider the question of referring to arbitration the proposal of the Gas Committee to alter the working arrangements, with the idea of finding employment for some more men. The matter was not, however, discussed; for since the City Council meeting the following resolution had been sent down from the central office of the National Society of Gas Workers: "Recognizing the seriousness of the Leeds Corporation Gas Committee's proposals, and the effect they may have on the gas workers' position throughout the country, we recommend our Leeds members to adjourn their meeting until after the General Executive Council, which will be held on Sunday, Nov. 12, so that the whole matter can be discussed by the representatives from the whole of the districts." In accordance with this resolution, the meeting was adjourned.

More Fires through the Fusing of Electric Light Wires.—Following close upon the recent fire at a Haslingden spinning mill, through the fusing of electric light wires, a disastrous conflagration from the same cause is reported from Chatburn, near Clitheroe. Last Tuesday morning, just as the employees were beginning work at the Victoria Cotton Mill, a fire started in the warehouse and preparing rooms; and by the time the brigade arrived the roof of the mill had been destroyed, and the contents of the warehouse were hopelessly involved. The efforts of the firemen were therefore chiefly directed to saving the weaving shed and engine, and preventing the fire spreading to adjacent property. After strenuous efforts, they were successful in this. The whole of the mill, except the weaving shed and engine, was ruined; the large building being gutted. The contents of the warehouse, including much cloth, and the preparing machinery, &c., were destroyed; the damage being very extensive. A smaller outbreak, for which the electric light wires were once more responsible, occurred at the Slough Baptist Chapel on Sunday week; and the building was filled with smoke. Not much damage was done, however; and, fortunately, a large congregation were got out of the building without panic.

Coventry's New Gas-Works.—The erection of the new gas-works at Foleshill for the Coventry Corporation is proceeding satisfactorily. The operations were commenced in 1902; and the Corporation decided to do away with the old works in 1907. Three years have therefore been devoted to the provision of the new buildings; and two years longer will be occupied in their completion. So far two gasholders have been erected, and the mains laid to connect these with the present works. The holders are in use for storage. The gas is sent through to them, and drawn back for distribution from the old works. The chemical works have also been built, and are at present in operation. The ground has been levelled, and the roads made, or nearly so; while the same remark applies to many of the mains inside the works. Just now the finishing touches are being applied to the buildings in which the carburetted water-gas plant is to be placed. It is expected that next spring this plant will be moved from the old works to the new; and that in the following autumn gas will be in course of manufacture. As soon as the new works have been proved to be in order, the old works will be dismantled, with the exception of the gasholders and the plant that is required for the distribution of gas. A staff of men will be kept at the old works for fitting, main-laying, &c.

The Aspatria Urban District Council have appointed a Committee to consider the advisability of purchasing the local gas-works.

The Directors of the Imperial Continental Gas Association recommend a dividend of 5 per cent. for the six months ending June 30.

The Chemical Engineering Company and Wilton's Patent Furnace Company have received an order for two sulphate of ammonia plants for the Grassmoor Colliery Company, Limited, of Chesterfield, in connection with a new battery of coke-ovens they are erecting.

The Ferndale Gaslight and Coke Company have instructed the Richmond Gas Stove and Meter Company to fit up a further number of complete automatic meter installations in their district. They have already fitted up for this Company some 600 complete installations.

The Crediton Gas Company, Limited, has been registered with a capital of £15,000, in £10 shares (500 being 5 per cent. cumulative preference shares), to acquire the business of the Crediton Gas and Coke Company, to adopt an agreement with Mr. W. A. Schultz, and to light with gas or other illuminant the parish and neighbourhood of Crediton, in Devonshire. There will be no initial public issue.

In the Vacation Court last Wednesday, before Mr. Justice Bray, Mr. Ashton Cross mentioned a winding-up petition, in the case of W. F. Mason, Limited, presented by Mason's Gas Power, Limited. Counsel said he understood that arrangements had been made for the payment of the creditors of the Company, and he therefore asked that the petition might stand over for another week, with the view of a settlement. His Lordship granted the application.

In a report on German trade during the first half of the present year submitted by Consul-General Schwabach, it is stated that aniline and other coal-tar dyes were exported in very large quantities—viz., 17,764 tons, against 14,704 and 14,620 tons in the corresponding half years of 1904 and 1903. These exports represented a value of £2,549,000, against £2,110,000 last year. The principal increases were to the United Kingdom (600 tons) and the United States (1300 tons).

The "MAIN" GAS FIRES. 1905-6.

The "Westminster."
Ornamental Design.

Price 45/-.

The 'Canterbury'
Ball Fuel Fire.

Price 45/-.

The "Dunkeld"
Nursery Pattern with Boiling Ring on Top.

Price 27/6.

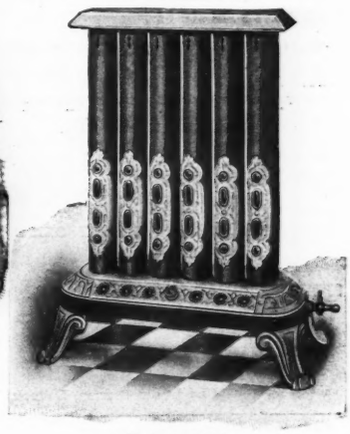
The "Netley."

Prices 24/6 & 30/-.

The "Oxford."

Bright Copper Reflector.
Prices 14/6, 17/6, & 20/-.

The "Durham"
Gas Radiator.



Price 42/6.

LONDON, GLASGOW, FALKIRK.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 165.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
500,000	10	Oct. 13	10½	Alliance & Dublin 10 p.c.	21—22½*	..	4 13 4
160,000	10	,,	7½	Do. 7 p.c.	14—14½*	..	5 3 5
200,000	5	May 12	6½	Bombay, Ltd.. . . .	6¼—7¼	..	4 9 8
140,000	5	,,	6½	Do. New, £4 paid	5¼—5¾	..	4 10 6
50,000	10	Aug. 31	14	Bourne-) 10 p.c. . .	20—30	..	4 13 4
51,810	10	,,	7	mouth Gas) B 7 p.c. .	16½—17½	..	4 0 0
53,200	10	,,	6	and Water) Pref. 6 p.c.	15½—16½	..	3 12 9
380,000	Stk.	Aug. 16	12½	Brentford Consolidated	250—255	..	4 18 1
300,000	,,	,,	9⅜	Do. New . . .	190—195	..	4 17 5
50,000	,,	,,	5	Do. 5 p.c. Pref. .	125—130	..	3 16 11
206,250	,,	June 15	4	Do. 4 p.c. Deb. .	103—106	..	3 15 6
220,000	Stk.	Sept. 15	11¼	Brighton & Hove Orig.	220—225	..	5 0 0
246,320	,,	,,	8½	Do. A. Ord. Stk. .	160—165	..	5 0 0
460,000	20	Sept. 28	10	British	42½—43½	..	4 11 11
100,000	Stk.	Aug. 16	6	Bromley, Ord. 5 p.c. .	119—123	..	4 17 7
165,700	,,	,,	4½	Do. do. 3½ p.c. .	89—93	..	4 16 9
500,000	10	Oct. 13	7	Buenos Ayres (New) Ltd.	12¾—13¼	..	5 5 8
250,000	Stk.	June 29	4	Do. 4 p.c. Deb. .	96—98	..	4 1 8
150,000	20	July 13	8½	Cagliari, Ltd.	24—26	..	6 6 11
100,000	10	Sept. 28	10	Cape Town & Dis., Ltd.	17—17½	..	5 14 3
100,000	10	Apl. 28	4½	Do. 4½ p c Pref.. .	10¼—10¾	..	4 3 9
50,000	50	May 2	6	Do. 6 p.c. 1st Mort.	53—55	..	5 9 1
50,000	Stk.	June 29	4½	Do. 4½ p.c. Deb. Stk.	102—104	..	4 6 7
1,400,000	Stk.	Aug. 31	5½	Commercial 4 p.c Stk. .	117—120	..	4 6 8
560,000	,,	,,	5	Do. 3½ p.c. do. .	113—115	..	4 6 11
450,000	,,	June 15	3	Do. 3 p.c. Deb. Stk.	86—88	..	3 8 2
800,000	Stk.	,,	6	Continental Union, Ltd.	120—123	..	4 17 7
200,000	,,	,,	7	Do. 7 p c Pref.	137—142	..	4 18 7
424,070	Stk.	—	5½	Derby Con. Stk. . . .	—	..	—
55,000	,,	June 3	4	Do. Deb. Stk. . . .	—	..	—
486,090	10	July 28	11	European, Ltd. . . .	22½—23½	..	4 13 7
354,060	10	,,	11	Do. £7 10s. paid	14⅝—15⅜	..	5 6 5
15,223,235	Stk.	Aug. 16	4⅛	Gas-) 4 p.c. Ord. . .	100—101	+1½	4 7 2
2,600,000	,,	,,	3½	light) 3½ p.c. max. .	50—52	−1	3 16 1
3,799,735	,,	,,	4	and) 4 p.c. Con. Pref.	110—113	+1	3 10 10
4,193 975	,,	June 15	3	Coke) 3 p.c Con. Deb.	87—89	−1	3 7 5
258,740	Stk.	Sept. 15	5	Hastings & St. L. 3½ p.c.	98—101	..	4 19 0
70,000	10	Oct. 13	11	Hongkong & China, Ltd.	19½—20½*	+½	5 7 4
3,800,000	Stk.	May 12	10	Imperial Continental .	219—222	−1	4 10 1
473,600	Stk.	Aug. 16	3½	Do. 3½ p.c. Deb. Red.	96—98	..	3 11 5
175,242	Stk.	Aug. 31	6	Lea Bridge Ord. 5 p.c. .	122—127	..	4 14 6
561,000	Stk.	Aug. 16	10	Liverpool United A . .	229—231	+3	4 6 7
718,100	,,	,,	7	Do do. B .	172—174	+1	4 0 6

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
306,083	Stk.	June 29	4	L'rpool Unit'd Deb. Stk.	111—113	..	3 10 10
75,000	5	,,	5	Malta & Medn., Ltd. .	4¼—4⅜	..	5 5 3
560,000	100	Oct. 2	5	Met. of) 5 p.c. Deb..	100—102	..	4 18 0
250,000	100	,,	4½	Melbourne) 4½ p.c. Deb.	100—102	+½	4 8 3
541,920	20	May 31	3½	Monte Video, Ltd. . .	11½—12¼	..	5 12 0
1,565,892	Stk.	July 29	4½	Newc'tle & G'tesh'd Con.	106—107	..	4 6 5
406,625	Stk.	June 29	3½	Do. 3½ p.c. Deb.	98—100	..	3 10 0
15,000	10	Aug. 31	10	North Middlesex 10 p.c.	18½—19½	..	5 2 7
52,940	11	,,	7	Do. 7 p.c.	13—14	..	5 0 0
300,000	Stk.	May 12	8	Oriental, Ltd. . . .	146—149	..	5 7 5
600,000	5	Sept. 14	7	Ottoman, Ltd. . .	6—6½	..	5 7 8
168,255	Stk.	—	6½	Plym'th & St'house 5 p.c.	—	..	—
398,490	5	Apl. 28	6	Primitiva Ord. . . .	6¾—7¼	..	4 2 9
796,980	5	July 28	5	Do. 5 p.c. Pref. .	5¼—5⅜	..	4 10 11
488,900	100	June 1	4	Do. 4 p.c. Deb. .	97—99	..	4 0 10
851,070	10	Oct. 13	7	River Plate Ord. . . .	13¾—13¾*	..	5 1 10
300,000	Stk.	June 29	4	Do. 4 p.c. Deb. .	96—98	..	4 1 8
250,000	10	Sept. 28	7	San Paulo, Ltd. . . .	13—13½	..	5 3 8
70,000	50	July 1	5	Do. 5 p.c. Deb. .	51—53	..	4 14 4
135,000	Stk.	Sept. 14	10	Sheffield A	233—235	..	4 5 1
209,984	,,	,,	10	Do. B	233—235	..	4 5 1
523,498	,,	,,	10	Do. C	233—235	..	4 5 1
126,105	Stk.	Aug. 31	5½	Shrewsbury Ord. 5 p.c.	104—106	..	5 3 9
70,000	10	Sept. 28	10	South African	15⅝—16⅛	..	6 1 3
6,250,000	Stk.	Aug. 16	5½	South Met., 4 p.c. Ord.	131—132	−1	4 3 4
1,895,445	,,	July 13	3	Do. 3 p.c. Deb.	87—89	−1	3 7 5
575,000	Stk.	Aug. 16	5½	S'th Suburb'n Ord. 5 p.c.	123—126	..	4 7 4
60,000	,,	,,	5	Do. 5 p.c. Pref. . .	125—130	..	3 16 11
112,533	,,	July 13	5	Do. 5 p.c. Deb. Stk.	132—137	..	3 13 0
502,310	Stk.	May 12	5	Southampton Ord. . .	111—114	..	4 7 9
87,950	,,	—	4	Do. 4 p.c. Deb.	—	..	—
120,000	Stk.	Aug. 31	6¾	Tottenham) A 5 p.c. .	122—125	..	5 0 0
563,620	,,	,,	4¾	and) B 3½ p.c. .	96—99	..	4 16 0
125,000	,,	June 23	4	Edmonton) 4 p.c. Deb.	105—108	..	3 14 1
182,380	10	June 15	8	Tuscan, Ltd.	9¾—10½	..	7 16 1
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	100—102	..	4 18 0
30,000	Stk.	Aug. 16	7⅜	Wands-) A 5 p.c. . .	—	..	—
255,636	,,	,,	6¾	worth) B 3½ p.c. . .	137—140	..	4 9 3
60,000	,,	,,	5¼⅞	and) C 3½ p.c. . .	113—116	..	4 13 6
57,564	,,	June 29	3	Putney) 3 p.c. Deb. Stk.	82—85	..	3 10 7
745,872	,,	Aug. 16	5	West Ham 5 p.c. Ord. .	104—106	..	4 14 4
185,000	,,	,,	5	Do. 5 p.c. Pref. . .	122—125	..	4 0 0
103,300	,,	June 29	4	Do. 4 p.c. Deb. Stk.	104—109	..	3 13 5

Prices marked * are "Ex. div."

WANTED, FOR SALE, CONTRACT, &c. ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

TRAVELLER, COAL TRADE. No. 4481.
SALESMAN. No. 4487.
ASSISTANT IN SHOW ROOM. Slough Gas Company.
FOREMAN. No. 4482.
CARBONIZING FOREMAN. No. 4480.
FOREMAN STOKER. Neath Gas-Works.
LAMP LIGHTER FOREMAN. No. 4484.

Situation Wanted.

ASSISTANT MANAGER OR WORKS FOREMAN. Tully, New Southgate.

Company Meetings.

DANISH GAS COMPANY. London Agency, Nov. 9, 2.30.
IMPERIAL CONTINENTAL GAS ASSOCIATION. Cannon Street Hotel, Nov. 7, 2.30 o'clock.

Plant, &c., for Sale.

GAS ENGINES (2). No. 4485.
WET GAS METERS (NEW). No. 4486.

Investment in Water and Gas Works. No. 4478.

Stocks and Shares.

BARKING GAS COMPANY. Oct. 31.
BROMLEY GAS COMPANY. Oct. 26.
COLONIAL GAS ASSOCIATION. Oct. 26.
CROYDON GAS COMPANY. Oct. 26.
KINGSTON GAS COMPANY. Oct. 26.
LITTLEHAMPTON GAS COMPANY. Oct. 25.
MITCHAM AND WIMBLEDON GAS COMPANY. Oct. 26.
NORTH MIDDLESEX GAS COMPANY. Oct. 31.
READING GAS COMPANY. Oct. 30.
SOUTHEND GAS COMPANY. Nov. 7.
SOUTHEND WATER COMPANY. Oct. 31.
SOUTH METROPOLITAN GAS COMPANY. Oct. 26.
SOUTH SUBURBAN GAS COMPANY. Oct. 26.
SUTTON GAS COMPANY. Oct. 26.
WEST KENT GAS COMPANY. Oct. 25.

TENDERS FOR

Fire-Clay Goods.

ROCHESTER, CHATHAM, AND STROOD GAS COMPANY, Tenders by Oct. 23.

Gasholder.

WATERFORD GAS COMPANY.

Light Oil.

BRIDGEWATER COLLIERIES. Tenders by Oct. 23.

Tar and Liquor.

WINSFORD GAS DEPARTMENT. Tenders by Oct. 24.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
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O'NEILL'S OXIDE
For GAS PURIFICATION.

LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 54 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 254 Oldham, and 2412 HOP, London.
Telegrams:—
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THE First Dutch Bogore Co., Ltd., HOLLAND.
General Manager (for England and Wales)—
CHARLES E. FRY, LEAMINGTON.
General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

OXIDE OF IRON.
(NATURAL.)

BALE & CHURCH will be pleased to send Quotations and Samples on application.
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT for all Retort and Furnace work.
PAINT for Gasholders, Purifiers, &c.
5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.

SPECIALLY prepared for the Manu-facture of SULPHATE OF AMMONIA.
SPENCER, CHAPMAN, & MESSEL, LTD.
(with which is amalgamated WM. PEARCE & SONS, LTD.
36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341, AVENUE.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia. BROTHERTON AND CO, LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

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HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.

Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Exchanged for Spent Oxide.

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SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants. We guarantee promptness, with efficiency for Repairs. JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON. Telegrams: SATURATORS, BOLTON. Telephone 0848.

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SPENT OXIDE.

THE South Metropolitan Gas Company are always open to receive OFFERS of SPENT OXIDE. Chief Office: 709, Old Kent Road, London, S.E. Telegrams: "METROGAS, LONDON."

SITUATION Wanted as Assistant MANAGER or WORKS FOREMAN. Age 24. Experienced in Adjusting and Working Regenerative Settings, Slopers, Horizontals, and Machine Stokers, Water-Gas Installations, Sulphate and Ammonia Concentrating Plants, and General Gas-Works Construction. Good Chemist and Draughtsman. Address, S. J. B. TULLY, 2, Pembroke Road, NEW SOUTHGATE.

GAS-WORKS FOREMAN.

WANTED, for a medium-sized works in the Midlands, a Retort-House and Yard FOREMAN. Must thoroughly understand control of men and all Gas Plant, especially Regenerative Settings. Wages 40s. per week. Apply, stating Age, Experience, and if married, and giving References, to No. 4482, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SLOUGH GAS AND COKE COMPANY.

WANTED, an Assistant for Gas Show-Room. Good Salesman and Window Dresser. Salary, 30s. per week, and small Commission. Apply, at once, to the Secretary, Mr. ARTHUR THOMAS, 46A, High Street, SLOUGH.

CARBONIZING Foreman Wanted for a Gas-Works in the North of England. Mechanical knowledge preferable. Wages £2 2s. per week. Apply, by letter, stating Age and References, and giving full Particulars of Experience and date at liberty, to No. 4480, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

LAMPLIGHTER Foreman required for a Gas Company in the South-West district of London. Wages 35s. per week. Must have knowledge of all the latest forms of Street Lighting. Reply, stating previous Experience, giving References, to No. 4484, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Provincial Gas Company, a smart, well-informed young man of good address as SALESMAN in the Gas-Fitting and Stove Department. Must be well up in all the newest Incandescent Burners and Gas Appliances. Address, stating Age, previous Experience, and Salary required, to No. 4487, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TRAVELLER (Experienced) wanted by Old Established Firm in Gas Coal Trade to work Eastern Counties and South. Every encouragement given to one with good connection. Address, in confidence, stating Age, previous Experience, and Salary required, to No. 4481, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

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TO BE SOLD, Gasholder, 30,000 cubic feet capacity; another 15,000 feet capacity. Both new and ready for delivery. The WRIGHT GAS PLANT COMPANY, LIMITED, 181, Queen Victoria Street, LONDON, and SHIPLEY GATE.

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Size.	Number.	Size.	Number.
2-Light	129	50-Light	3
10 "	2	60 "	1
20 "	9	80 "	3
30 "	2	100 "	1

Address, No. 4486, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WATERFORD GAS-WORKS.

GASHOLDER.

THE Directors of the City of Waterford Gas Company invite TENDERS for the Supply and Erection of a THREE-LIFT HOLDER. Full Particulars, Specification, and Drawings may be had from the undersigned on payment of One Guinea. R. BRUCE ANDERSON, A.M.I.C.E. 5, Westminster Chambers, Victoria Street, London, S.W.

BRIDGEWATER COLLIERIES COKE-WORKS. (THE EARL OF ELLESMERE.)

TENDERS are invited for the Light OIL produced at the above Works for a period of Six or Twelve Months from the 1st of November, 1905, delivered into Contractor's Tanks at the Bridgewater Colliery Siding, Wharton Hall, on the Pendleton and Hindley branch of the Lancashire and Yorkshire Railway; or at the Brackley Siding on the Little Hulton mineral branch of the London and North-Western Railway. Tenders, endorsed "Tender for Light Oil," to be addressed to Mr. Thomas M. Brown, Bridgewater Coal Office, 4, Chapel Walks, Manchester, on or before the 23rd of October, 1905. Manchester, Sept. 26, 1905.

ROCHESTER, CHATHAM, AND STROOD GASLIGHT COMPANY.

RETORTS, &c.

THE Directors invite Tenders for the supply of FIRE-CLAY RETORTS, FIRE-BRICKS, and CLAY. Specifications and Forms of Tender may be obtained from the undersigned, to whom Tenders, endorsed "Retorts, &c.," must be delivered on or before noon of Monday, Oct. 23, 1905. J. M. VEEVERS, Engineer and General Manager. Gas Offices, Rochester, Oct. 12, 1905.

WINSFORD URBAN DISTRICT COUNCIL. (GAS DEPARTMENT.)

THE above Council are prepared to receive TENDERS for the purchase of the surplus TAR and AMMONIACAL LIQUOR made at their Gas-Works for a term of One Year from the 16th day of October, 1905. Full Particulars and Form of Tender may be obtained on application to Mr. F. Sidwell, Manager, Gas-Works, Winsford. Tenders, marked "Surplus Tar." to be delivered to the undersigned on or before the 24th day of October, 1905. JNO. H. COOKE, Clerk to the Council. Council Offices, Russell Street, Winsford, Cheshire, Oct. 9, 1905.

IMPERIAL CONTINENTAL GAS ASSOCIATION. (INCORPORATED BY ACT OF PARLIAMENT.)

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of Proprietors of this Association will be held at the City Terminus Hotel, Cannon Street, London, E.C., on Tuesday, the 7th of November next, at 2.30 p.m. precisely, when a Report will be made to the Proprietors, a Dividend declared for the Half Year ended the 30th of June, 1905, and the usual Ordinary Business of such Meeting transacted. Notice is Hereby also Given, that the CAPITAL STOCK TRANSFER BOOKS WILL BE CLOSED from the 24th inst. to the 7th prox., both days inclusive. The Dividend will be paid on the 14th of November. By order of the Board, ROBERT W. WILSON, Secretary. 21, Austin Friars, London, E.C., Oct. 16, 1905.

DANISH GAS COMPANY.

NOTICE is Hereby Given, that the FIFTY-FIRST ANNUAL ORDINARY GENERAL MEETING of this Company will be held at the Offices of the Company's London Agency, No. 13, Victoria Street, Westminster, on Thursday, the 9th day of November next, at 2.30 o'clock p.m., for the following purposes—viz:

1—To receive the Report of the Directors and the Accounts for the Year ended June 30, 1905.
2—To Declare a Dividend.
3—To consider the remuneration of the Directors.
4—To elect Auditors for the ensuing Year.

By order of the Board, H. G. WARREN, London Agent. London Agency: 13, Victoria Street, Westminster, S.W., Oct. 11, 1905.

LITTLEHAMPTON GAS COMPANY, LIMITED.

ISSUE OF 400 NEW £5 SHARES.

MESSRS. SPARKS AND SON are favoured with Instructions to SELL BY AUCTION, at their Sale Rooms, 25, High Street, Littlehampton, on Wednesday, the 25th day of October, 1905, at 3.30 p.m. precisely,

400 £5 SHARES

in the above Company, in Lots of Four Shares each. Full Particulars and Conditions of Sale may be obtained of Mr. WILLIAM BELDAM, the Company's Secretary, LITTLEHAMPTON, or at the Offices of the AUCTIONEERS at LITTLEHAMPTON or ARUNDEL.

READING GAS COMPANY.

(INCORPORATED BY 25th and 26th Vic. cap. 84. 30th June, 1862.)

SALE BY TENDER OF £10,000 ORDINARY STOCK.

THE Directors invite Tenders (at not less than £105 per £100 Stock) for £10,000 ORDINARY STOCK in the above-named Company, to be raised in pursuance of the powers of "The Reading Gas Act, 1902." This Stock will rank for a maximum dividend of 5 per cent. per annum. Full dividends on the Company's Stocks and Shares have been paid since its Incorporation in 1862. The Stock will be issued in amounts of not less than £10 or multiples thereof, and will be registered in the names of the purchasers (or their nominees) free of expense. Payment for the Stock is to be made by the 30th of November, 1905. The Dividends are paid half-yearly, on the 1st of March and 1st of September. The liability of the Stockholders is limited; that is, when the Stock is paid for there is no further liability. Particulars, with Forms of Tender, may be obtained on application to the Secretary, to whom Tenders must be delivered not later than Monday, the 30th of October next. By order of the Directors, A. CANNING WILLIAMS, Secretary. 159, Friar Street, Reading, 3rd October, 1905.

"Invaluable to those engaged in lighting works."—ENGINEERING. NOW READY, Price 10/6 net. REVISED TO JULY, 1905.

TWENTY-EIGHTH ANNUAL ISSUE.

GAS-WORKS DIRECTORY AND STATISTICS 1905-6

WITH ALPHABETICAL LIST OF CHAIRMEN, MANAGERS, ENGINEERS, AND SECRETARIES.

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NORTH MIDDLESEX GAS COMPANY.

ISSUE OF £5000 FIVE PER CENT. PREFERENCE STOCK.

THE Directors of the North Middlesex Gas Company hereby offer the above Stock FOR SALE BY TENDER, the last day for the reception of Tenders being Tuesday, the 31st of October, 1905.

Minimum price of issue, £120 per £100 Stock.

Particulars of the Sale and Forms of Tender may be had on application to the undersigned, or at the District Offices of the Company, 11, The Broadway, Church End, Finchley, and 32, Church Road, Hendon.

By order,
ERNEST L. BURTON,
Secretary.

Secretary's Office:
5 and 6, Great Winchester Street,
Old Broad Street, London, E.C.
Oct. 9, 1905.

By order of the Executors of the late Mr. J. D. Hayton.

GAS STOCKS AND SHARES
IN THE
SOUTH METROPOLITAN,
SUTTON, CROYDON, MITCHAM & WIMBLEDON,
KINGSTON-UPON-THAMES,
BROMLEY, WEST KENT,
AND
SOUTH SUBURBAN GAS COMPANIES
ALSO IN THE
COLONIAL GAS ASSOCIATION, LTD.,
and numerous well-known Industrial and other Companies.

MESSRS. MORRIS AND SANDELL will SELL BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Thursday, Oct. 26, 1905, at Two o'clock precisely (in convenient lots), Stocks and Shares as above.

Particulars may be obtained of Messrs. PENNINGTON AND SON, 64, Lincoln's Inn Fields, W.C., and of the AUCTIONEERS, Cambridge House, Farnborough, HANTS.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
BARKING GAS COMPANY.

NEW ISSUE OF 600 £10 ORDINARY SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, the 31st of October, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By Order of Trustees and other Owners.
GAS AND WATER STOCKS AND SHARES
IN THE
SOUTHEND WATER-WORKS COMPANY
AND
CROMER GAS COMPANY.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Oct. 31, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHEND GAS COMPANY.

NEW ISSUE OF £20,000 NEW ORDINARY "B" STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, Nov. 7, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

THOMAS DUXBURY & CO.,
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Gas Engineers' Agents and Contractors for
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FLANGE PIPES FOR STEAM.

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Patent Automatic Machinery

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GLASGOW.

[See Illustrated Advertisement, Oct. 3, p. 10.]

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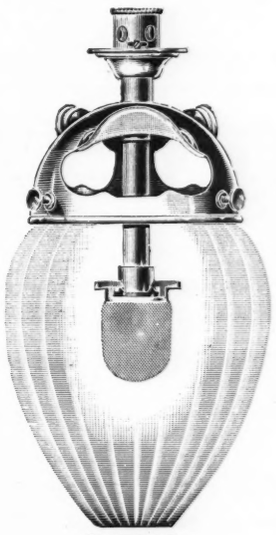

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Gas, Steam, and other Fuel for Home and Export.
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ESTABLISHED 1860.

IMPORTANT NOTICE.

It is the practice of the "Gas World" to publish from time to time analyses of the accounts of Gas Undertakings in this Country. A number of such analyses appeared in the issue for September 16, and they show that at Fenton, Longton, Rotherham, and Tipton, some of the highest results were obtained in Gas Made and Coke Sold.

It may be interesting to Gas Engineers to learn that at these four places Winstanley's Settings are in use.

The Winstanley Speciality Company, Newton Chambers, Cannon Street, Birmingham.

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And Fittings & Accessories.

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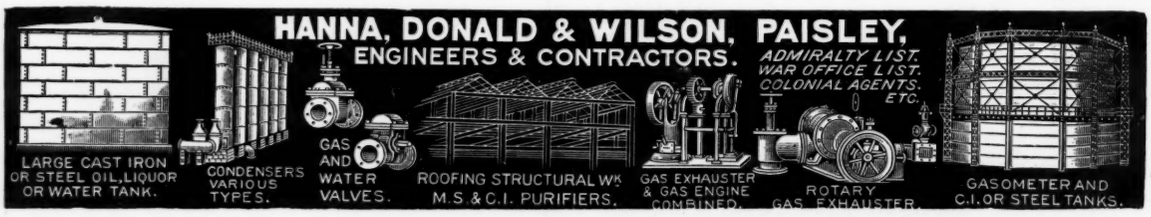
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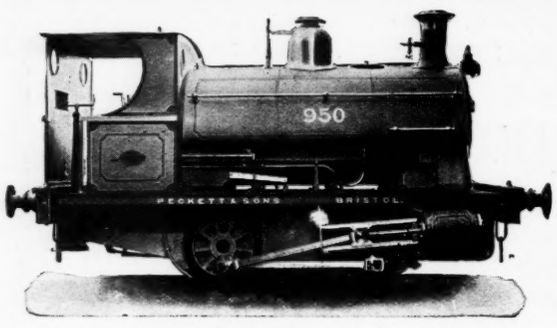

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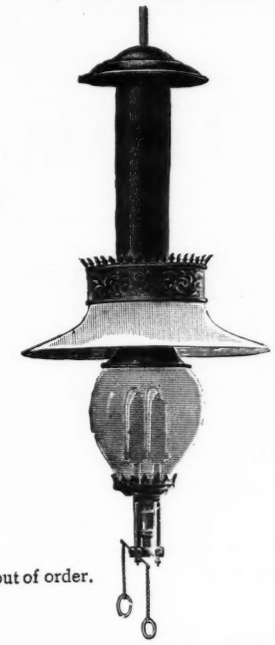

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1681 HOLBORN.

REASONABLE,
RADIANT,
AND
RELIABLE.

ADVANTAGES:
High Power on low pressure.
Noiseless and Cool.
Intense Light at Small Cost.
Absolutely No Shadow.
Globes Unbreakable from Expansion.

SIMPLE,
SCIENTIFIC,
AND
SERVICEABLE.

MODERN CATALOGUE FREE.

Nothing to get out of order.

Finished in Green and White.

FARRINGDON STREET AND AVENUE, LONDON, E.C.,
STREET LANTERN MANUFACTURERS, PATENTEES, AND LIGHTING EXPERTS.

SAML. CUTLER & SONS,

MILLWALL, LONDON.

GASHOLDERS.
STEEL TANKS.
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JÄGER GRIDS

CAPACITY OF PURIFIERS DOUBLED.
PRESSURE CONSIDERABLY REDUCED.

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Special Circular describing the Jäger System of Purification on application.

CARBURETTED WATER GAS

Maximum Efficiency Guaranteed.

A LARGE NUMBER OF PLANTS IN OPERATION.

Every Requirement for Gas-Works.

(195.)

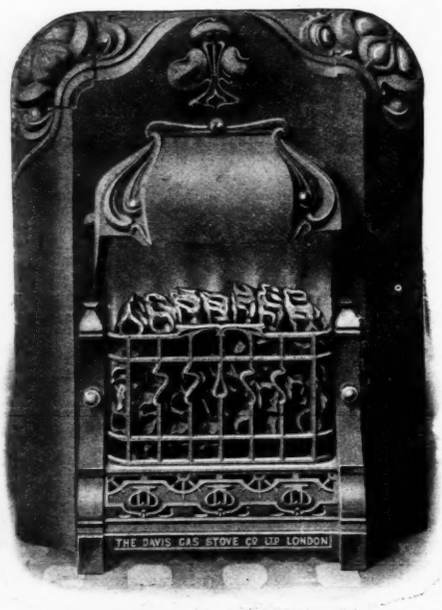
The Davis Gas Stove Co. Limited. LONDON · LUTON & FALKIRK

The Burner's the Thing

that makes or mars a Gas Fire; and the thing for the present season is the Burner fitted to our "DIAMOND" series of Gas Fires.

It is entirely novel in construction.
It is as silent in action as a burner can be.
There is no explosion when the gas is turned off.
It will not light back.
Air is introduced in a manner which ensures a perfect combustion hitherto unknown to Gas Fires.

The Stoves of this series are simple in construction, all parts—Bricks, Burners, &c.—being easily removed.



No. 25.

The Series comprises Six Fires, known by the following numbers—

15, 25, 35,
45, 55, 65.

The accompanying cut illustrates

No. 25.

A very artistic Fire with solid brass ornament on front.

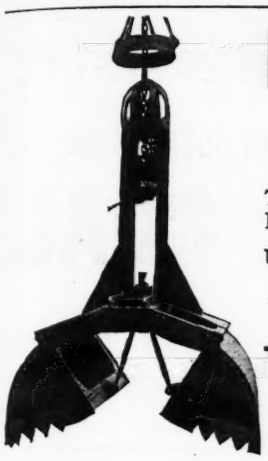
	Height.	Width.	Fire.	Height from floor to top of flue.
Sizes—	24	19¼	10	17¼ inches.

PRICES.

Best Berlin-black Enamel **35/-**

Send for Catalogues to show your Consumers.
These are the Fires that will attract them.

HEAD OFFICE: 200, Camberwell Road, S.E. CITY SHOW ROOMS: 59, Queen Victoria St., E.C.



HONE'S PATENT GRABS

Automatic, Efficient, & Economical.

APPLICABLE TO ANY ORDINARY SINGLE CHAIN CRANE.

These Grabs are unequalled for handling Coal, Coke, Ballast, Sand, Macadam, Ores, &c., effecting in all cases very substantial savings.

Used by all the Principal Gas Companies, Colliery Owners, Coal Merchants, Engineers, Contractors, &c., at Home and Abroad.

Applications for Prices and Particulars are invited by the Sole Manufacturer—

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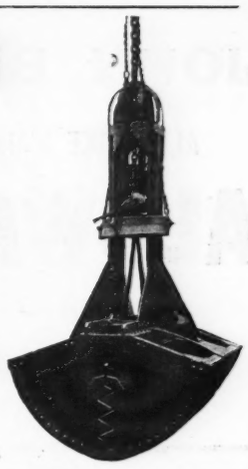
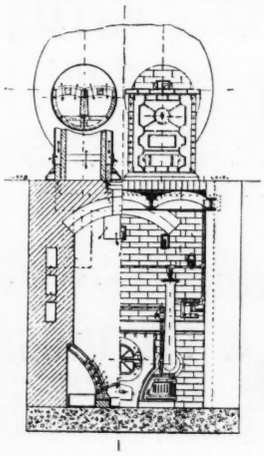
CANNING TOWN, LONDON, E.



* SYDNEY *

LAMPS

are the line you will want to push this season. There is nothing to compare with it for economy, brilliancy, and general satisfaction. The "K" Burner lends itself far better than any other to cluster arrangement. The three burners make a beautiful compact lamp of 250-candle power, giving a steady reliable light and no trouble. MOFFAT'S LTD., 155, FARRINGDON ROAD, LONDON, E.C., Patentees and Lighting Engineers.



HISLOP'S

PATENT SYSTEM OF BOILER FIRING.

20 % Saving in Fuel.
20 % more Water Evaporated per hour.
Steady Steam Pressure.
Fuel Employed—Coal or Coke.

Perfect Combustion—17 to 18 % CO_2 in Waste Gases.
Producer Cleaned once in 24 to 48 hours.
Applicable to all Boilers.

INEXPENSIVE. DURABLE. SIMPLE.

DESIGNS AND ESTIMATES FROM

R. & G. HISLOP, 13, ST. JAMES PLACE, PAISLEY.

LONDON—87, VICTORIA STREET, S.W.

JOHN BROWN & CO., LTD., SHEFFIELD,

Proprietors of

ALDWARKE MAIN, CAR HOUSE, & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 Feet of 19-Candle Gas per Ton.
Value in Pounds of Sperm, 820·20.

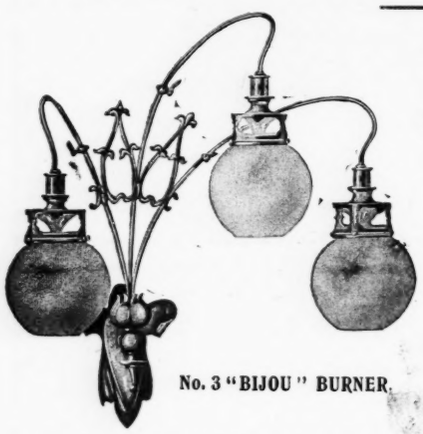
VERY FREE FROM IMPURITIES.

TELEGRAMS: "ATLAS, SHEFFIELD."

THE

ORIGINAL NEW INVERTED BURNERS.

The "BIJOU" BURNER is the neatest, most decorative, and economical ever known, and is the real rival to Electric Light at One-Tenth the cost.



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All Mantles we supply are made of best double-woven Ramie, and marked with our Trade Mark,

"NICO."

No. 2 BURNER.

INVERTED FITTINGS OF EVERY DESCRIPTION AND UP-TO-DATE DESIGNS.

The New Inverted Incandescent Gas Lamp Co., Ld.

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D. HULETT & CO., LTD.,

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GAS SERVICE CLEANSERS.

LAMP TORCHES.

DRY GAS-METER MAKERS.

WROUGHT-IRON TUBES & FITTINGS.

STREET LAMPS & POSTS.

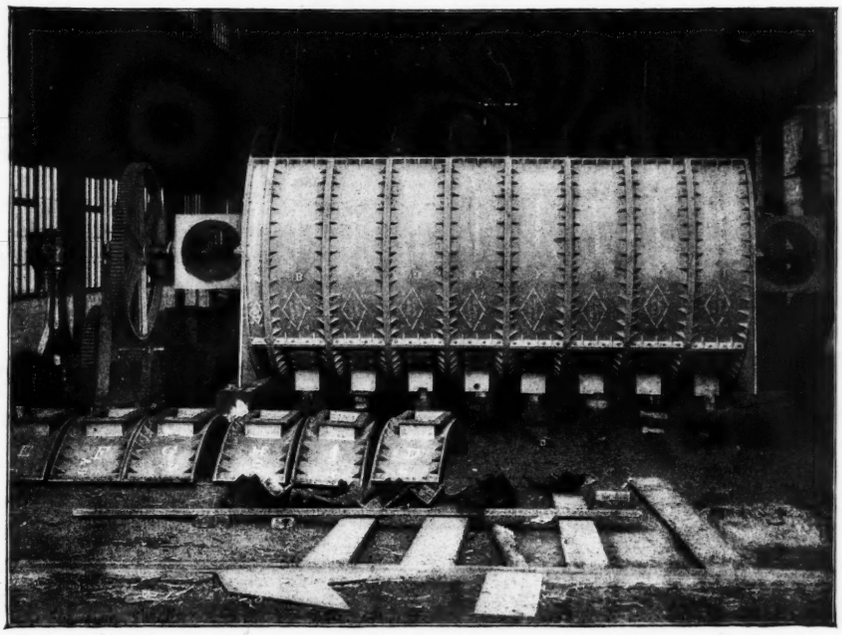
PRICE LISTS ON APPLICATION.

THE WHESSOE FOUNDRY CO., LTD.

Works: DARLINGTON.

LARGE AREA OF WASHING SURFACE.

REMOVAL OF THE WHOLE OF THE AMMONIA AND A LARGE PERCENTAGE OF CO_2 AND SH_2.



SLIP OF GAS IMPOSSIBLE OWING TO OUR PATENT TELESCOPIC SLIDING JOINT

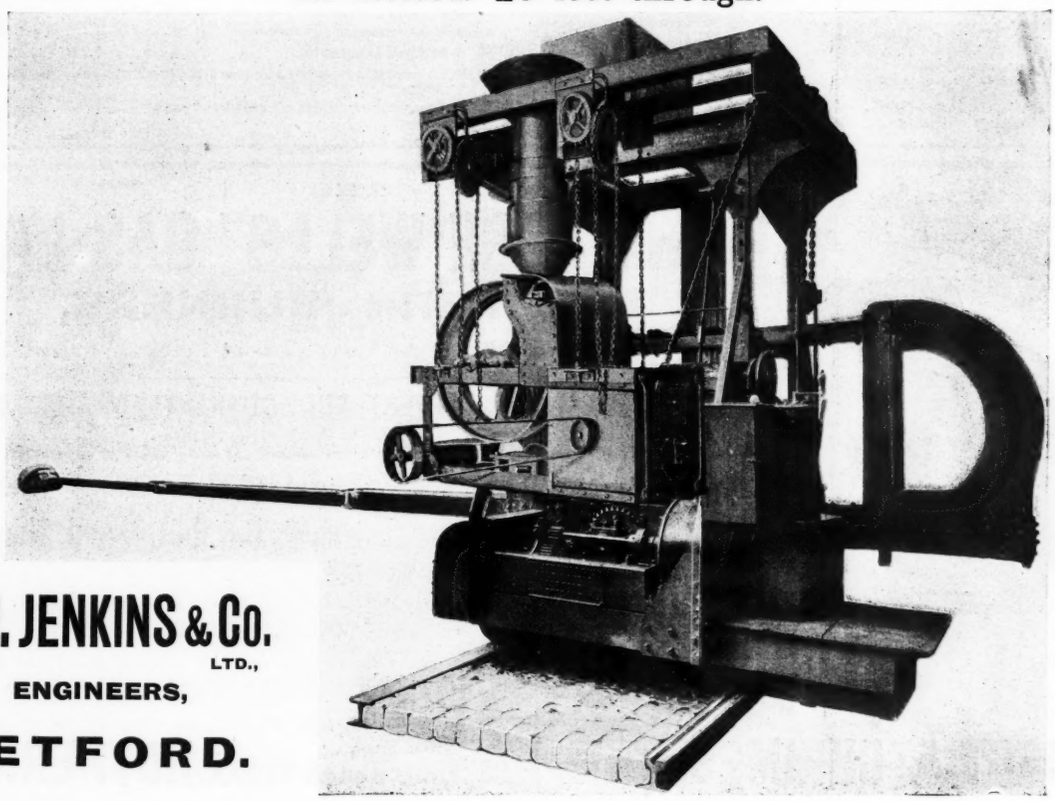
BUNDLES EASILY ACCESSIBLE FOR CLEANING.

"Whessoe" Rotary Washer-Scrubber (H. Kirkham & Chandler's patent). **Capacity 1,500,000 Cub. ft. per diem.**
One of Two Machines supplied by us to a Foreign Gas-Works, photographed in our shops during course of construction.

London Office: **106, CANNON STREET, E.C.**

THE COMPLETE STOKER.

Both Discharging and Charging Operations performed by one machine, for Retorts 20 feet through.



W. J. JENKINS & Co. LTD.,

ENGINEERS,

RETFORD.

GEORGE WILSON, COVENTRY,

Wet and Dry Gas Meter Manufacturer.

PREPAYMENT METERS for Pennies, Shillings, or any other Coin.

INSTALLATIONS AT THE GAS-WORKS OF—

West Bromwich, Ilford, Tipton, Bilston, Cleethorpes, Rushden and Higham Ferrers, Barking, Ilfracombe, Cape Town, Erfurt, Pfortsheim, Iserlohn, Barmen-Rittershausen, Mülheim a.d. Ruhr, Nürnberg, Plauen, Rome, Lyons, Gijon, Brummen, Osterfeld, Warstein, Wiborg.

HIGHEST EFFICIENCY.
GREATEST ECONOMY.

THE DELLWIK-FLEISCHER WATER GAS PROCESS.
PATENTS IN ALL COUNTRIES.
BLUE WATER GAS, CARBURETTED WATER GAS.

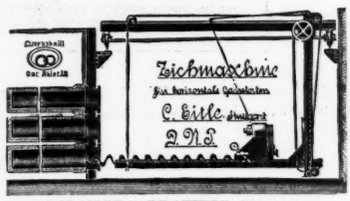
COMBINED WITH
SELF-CARBURETTING
AT
Imperial Continental Gas Association, Mariendorf-Berlin, Königsberg, Remscheid, Ludwigshafen, Güstrow, Salzwedel, Dortmund, Stuttgart, Hanau, Furth (Bavaria), Freiberg (Saxony), Osnabrück, Görlitz, Arnhem, Zutphen, Berne, St. Quentin, Barcelona, Beyrouth (Syria), Trieste.

THE
DELLWIK-FLEISCHER WATER GAS SYNDICATE
72, VICTORIA STREET, WESTMINSTER, LONDON, S.W.

C. EITLE, ENGINEERING WORKS, STUTTGART.

Telegraphic Address: "EITLE, STUTTGART." Telephone: No. 635.

"KOBOLD" CHARGING APPARATUS.



"SCHLANGE" DRAWING MACHINE

ADVANTAGES OF THE "KOBOLD" CHARGING APPARATUS.

1.—The simplest of all existing Charging Machines, as in charging there is only ONE shaft working.
2.—Almost indestructible in construction, as there are no combustible parts exposed to the heat of the Retorts.
3.—Uniform bed of coal of any desired height in the retort, and consequently any desired weight of charge may be inserted.
4.—Greater yield of gas in comparison with all other types, owing to the coal being deposited in the retort most advantageously.
5.—Least inrush of cold air owing to the close fit of the charging mouthpiece with the retort mouthpiece, with consequently practically no cooling of the retort, the least outrush of flame and smoke, and therefore smallest loss of gas.
6.—Smallest consumption of power.
7.—Most rapid working, as the complete charging of a retort requires only two pulls of a lever.
8.—May be set at any position in regard to height by either manual or motor power.
9.—Lowest cost to purchase; paying interest and redemption in about three years.

ADVANTAGES OF THE "SCHLANGE" DRAWING MACHINE.

1.—The simplest and best drawing machine in the world for horizontal retorts.
2.—Least time required to draw a retort (10-15 seconds).
3.—Most careful treatment of the lumps of coke, as well as the retort.
4.—Smallest consumption of power.
5.—Lowest cost to purchase.
6.—Most substantial construction, and consequently very low maintenance charges.
7.—Rapid and cheap working, consequently pays interest and redemption in a few years.

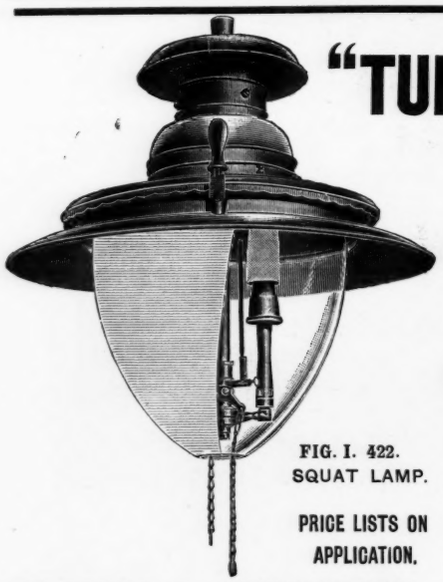


FIG. I. 422.
SQUAT LAMP.

PRICE LISTS ON APPLICATION.

THE
"TUNBRIDGE WELLS" GAS-LAMP
FOR KERN BURNERS,

with Bye-Pass Lever Cock at Bottom. Patent.

EVERY LAMP PERFECT AND GUARANTEED SHADOWLESS.

ADOPTED BY VARIOUS GAS COMPANIES.

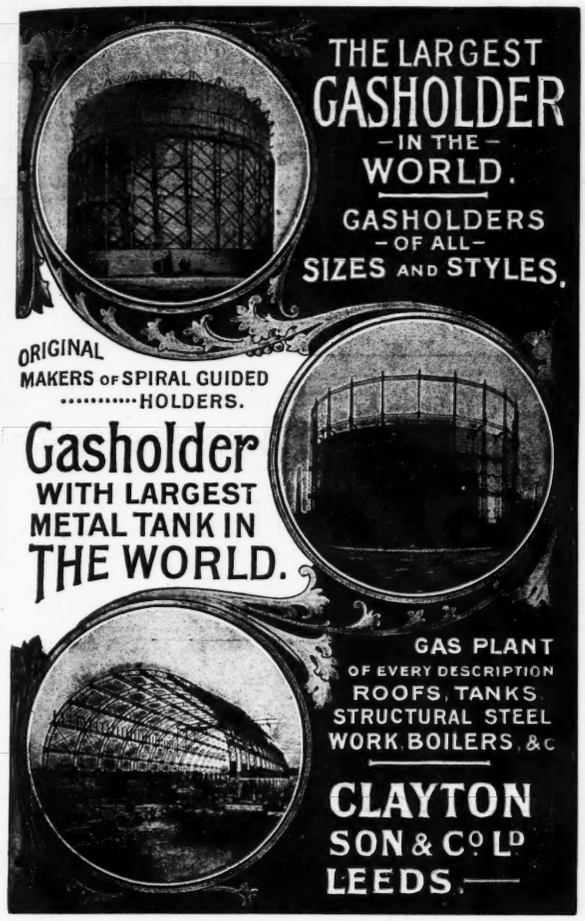
UNSURPASSED IN
Illuminating Power, Economy, Durability, and Simplicity.

ENAMELLED IN THE FOLLOWING COLOURS:
WHITE AND GOLD. BLACK AND GOLD.
BROWN AND GOLD.

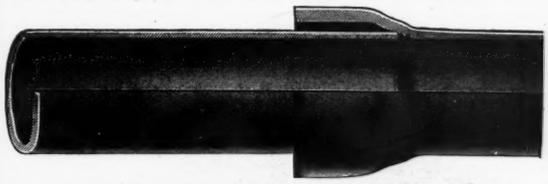
FIG. I. 422. Squat Lamp for low ceilings, with 18 in. Reflector and Pilot Light Tubes for Two Size 3 Kern Burners. Extreme Length as drawn, 20 inches.

Manufactured by

GUEST & CHRIMES, FOUNDRY & GENERAL BRASS WORKS, ROTHERHAM.



MANNESMANN



WELDLESS STEEL SPIGOT AND FAUCET PIPES

In any Length up to 40 feet for

GAS & WATER MAINS.

A PERFECT SUBSTITUTE FOR CAST-IRON MAINS.

— THE —

BRITISH MANNESMANN TUBE Co.,

— LIMITED, —

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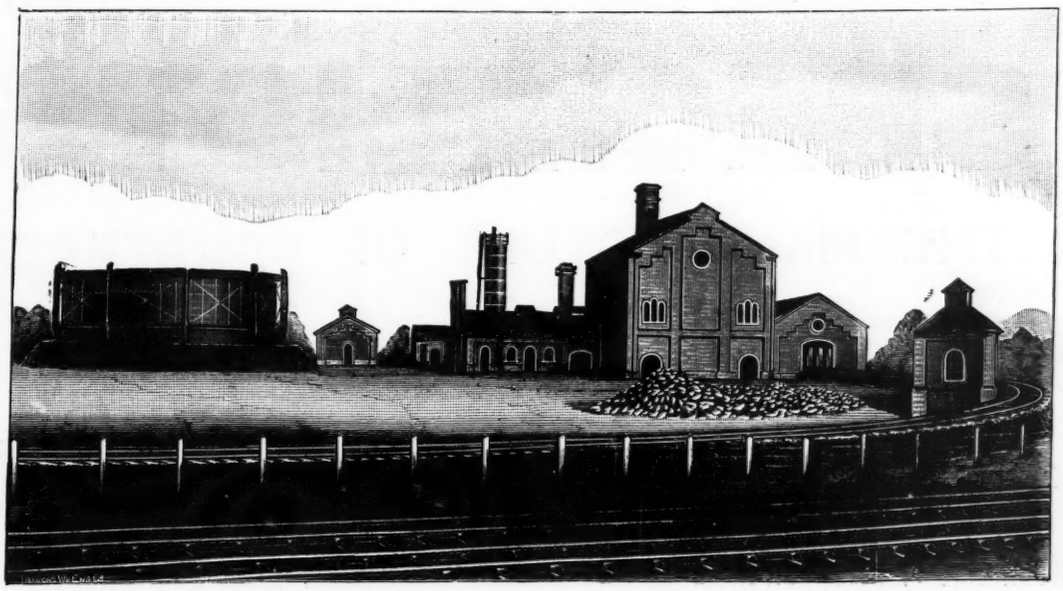
R. & J. DEMPSTER, LIMITED, MANCHESTER.

Telegraphic Address: "SCRUBBER, MANCHESTER."
National Telephone Nos. 54 and 2296.



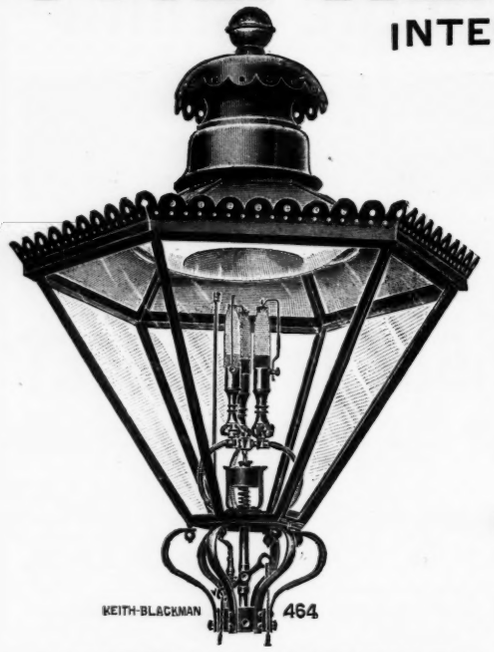
Complete New Gas-Works at Slough Erected by us in 1902.

For full Description of Works, see "JOURNAL OF GAS LIGHTING," for Nov. 18, 1902.

London Office: 165, Gresham House, Old Broad St., E.C.

THE KEITH LIGHT.

INTENSIFIED INCANDESCENT GAS.



Hexagonal Reflector Wind-Proof Lantern with Anti-Vibrator and 3-300 c.p. Keith Burners.

2000 INSTALLATIONS NOW IN USE.

KEITH'S LANTERNS are made in numerous designs and sizes.

WIND AND RAIN PROOF.

RIVETED TOPS. MOVEABLE REFLECTORS.

Suitable for both High and Low Pressure Incandescent Gas Burners.

JAMES KEITH AND BLACKMAN CO., LTD.,

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CLAPHAM BROS., LTD.

ESTABLISHED OVER 60 YEARS.] **KEIGHLEY.**

SPECIALISTS

IN THE MANUFACTURE OF CONDENSERS, WASHER-SCRUBBERS, AND

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CARBONIZING PLANTS, FOR INCLINED OR HORIZONTAL SYSTEMS. LAMP COLUMNS, TANKS, ETC.

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